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TO OUR READERS.

We have, from time to time, in response to our invitation to "The man on the Land," received some very useful and informative communications, for which space has always been available in the Journal. We shall gladly welcome articles from our readers on subjects connected with rural occupations in their respective districts, especially on those which deal with established industries, and others as yet in the probationary stage. All such articles, addressed to "The Editor," will be carefully considered, but controversial matter cannot be entertained. Articles must be authenticated by the writers' signatures. Anonymous articles will not be accepted.

Agriculture.

A BRIEF HISTORY OF COTTON-GROWING IN QUEENSLAND.

As plants of the cotton family are indigenous to Queensland, the fact may be accepted that this State is adapted for the cultivation of cotton.

About the year 1858, Dr. Lang, who had spent some time in New South Wales, where he made successful attempts at cotton-growing, went to England to advocate emigration to Australia, and to advise emigrants to take up cotton-growing for export to the British market. Whether many British emigrants sailed for New South Wales is not known to-day, but shiploads of people came to Queensland, and amongst them were many of those who had attended Dr. Lang's lectures on cotton-growing. It was he who induced the immigrants by the ship "Fortitude" to take up the cultivation of cotton. They did so, but despite the heavy crops produced on the river flats, the venture did not prove remunerative, until after the outbreak of the Civil War in America in 1861.

Early in the first session of the first Parliament in Queensland, in the "Alienation of Crown Lands Act," provision was made by which a bonus of £10 per bale of good, clean, Sea Island cotton for five years, and of £5 per bale for the following two years, was paid to shippers of cotton to Europe. About this time, the Lancashire spinners were reduced to such straits that they gladly paid high prices for all that could be got in Queensland, and the Lancashire Cotton Company was formed, most

of its members coming to Queensland, where they took up land in the Logan district for the purpose of growing Sea Island cotton. The company brought to Queensland some hand cotton gins, and even with these primitive appliances their operations were, for a time, successful, until at the close of the American Civil War prices of cotton in the British market fell to a point when cotton-production in Queensland proved unprofitable.

During the boom era in Queensland, cotton-growers were greatly assisted, both in East and West Moreton, by the ginning houses established in the former district by Mr. A. J. Boyd, and in the latter, by Messrs. J. and G. Harris, at Harrisville, near Ipswich. The proprietors of these ginneries purchased the raw cotton from the growers at 3d. per lb., and at this price the farmers made a considerable profit. So profitable was the cotton crop, that from Brisbane to Ipswich cotton fields were everywhere in evidence, and, owing to the drought-resisting powers of the cotton plant, these throve and bore heavily when the staple crops of maize and potatoes failed owing to drought.

The industry dwindled until the early eighties, when the Ipswich Cotton Company was formed for the manufacture of cotton goods, and to encourage the company the Government of the day offered a bonus of £5,000 for the first cotton goods manufactured by them. The origin of the company mainly arose through the fact that at that time most of the cotton was grown in the district in which Ipswich is situated—the West Moreton—and therefore, to preserve the industry, the company imported machinery of the latest kind, and succeeded in making the required quantity of cotton goods and claiming the bonus, after which it went into liquidation, the cause of which was not the lack of the raw material. The work was afterwards taken up by Joyce Bros., who were successful in manufacturing meat cover, butter cloth, mosquito nets, and such like goods. At this trade the firm were fairly successful, but with the advent of Federation and the free entry of cotton goods, the company was faced with the competition of goods from countries where labour and all business in connection with the manufacture of cotton are much cheaper than in Queensland. Representation for relief in the shape of a bonus to make up the difference, or for a protective duty, were made by the company to the Commonwealth Government directly, and through the Member of Parliament for the district, but without avail, and the company had perforce to close down.

Thus two periods of cotton-growing passed and failed, through circumstances in which the growers had no part, and these happened within the memory of men then living, who had been active in the first period, and consequently it is no wonder that growers were discouraged and looked askance at cotton as a profitable crop. Had the Commonwealth assisted the company as might reasonably have been expected, cotton manufacture would now have been an established fact, at least in the lines that have been mentioned, if not in additional lines. The drought of 1902 then happened. Farmers were without crops of any kind, and to save the situation the State, through the Department of Agriculture, to encourage the cultivation of cotton, not only for the lint, but as a fodder crop in times of stress, for which it is well adapted, undertook to supply seed, receive the crop, gin, and sell it on owners' account, and meanwhile made an advance when the raw cotton was received into store. No commission was to be charged, the expense of ginning, baling, and marketing being debited against the grower. The advance in 1914 was 1½d. per lb. in store, the lint being sold at 6d. per lb., which gave the growers a net return of 1.65d. per lb. for cotton picked on the farm. Taking the moderate return of 1,250 lb. to the acre, the return is equal to £8 11s. 10d., but gradually the advance grew until in 1918 it was 2d. per lb., and the net return rose to 4d. per lb., or upon a 1,250 lb. crop to the acre at the rate of £20 16s. 8d. to the acre, the lint sold weighing something over 24½ tons.

In the early days a great proportion of the seed cultivated was of the Sea Island cotton, but for the distribution lastmentioned Upland American cotton was obtained, and this forms almost the whole of the lint placed on the market. The Department of Agriculture, in its present campaign, has deprecated a return to the plantation or large-area system, and has strongly urged the cultivation of a few acres on a farm as a subsidiary crop. The reason for this was two-fold. In the first place the labour (Kanaka) that was available in the plantation period is not to be obtained, and secondly a grower with only a few acres can handle such an area with the help at hand without recourse to additional or temporary assistance. Later, if the cultivation of cotton becomes established, the areas would naturally be enlarged in proportion to the profit derived.

About 1903 a Mr. Thomatis, of Cairns, introduced what is understood to be a cross of the Mexican-Peruvian cottons, or, in plain words, an improved Sea Island cotton, which was named Caravonica. This cotton was much advertised, and a

company was formed, principally with foreign capital, to grow the cotton on a large scale, with the help of aborigines. Since the beginning of the war, however, nothing has been done with this cotton, which, being a hybrid, requires careful attention to preserve its qualities, and is not a good cotton for general distribution, and consequently is not used by the Department of Agriculture and Stock for distribution.

Apart from the manufacture of Queensland-grown cotton into cotton goods, there is a demand in Australia for all the cotton that can be grown here for many years. The use to which it is generally put is for strengthening, and at the same time cheapening, the manufacture of woollen goods. In 1916-17, at the middle of the war, Australia imported about 282 tons of raw cotton, principally from China and Hong Kong, and as time goes on the demand for these purposes will increase, but with proper encouragement there seems to be no reason why the manufacture of cotton goods should not be as prominent an industry in Australia as the manufacture of woollen goods.

It must not be forgotten, when considering the cotton question, that, in the most settled districts, there are many still living who have been intimately connected with the three periods of the cotton industry in Queensland.

Attached are figures showing the quantity exported, the export value at shippers' figures, and the acreage for each year since 1866. The production for each year is not given because it would be somewhat misleading, insofar that the crop planted in a year would not be ginned until the next.

Total Exported—13,046,393 lb.

Export Value—£482,783.

Acreage—96,117 acres.

In 1892 and 1893 the exports amounted to 80,783 lb., of an export value of £2,692, from a total area of 908 acres.

There was then an almost total cessation of cotton-growing until the period between 1906 and 1910, when exports amounted to 20,715 lb.; valued at £1,104.

*The quantity of ginned cotton produced from 1914 to 1918 was as follows:—

	Total Seed Cotton. Lb.	Lint. Lb.
1914	9,445 ..	2,794
1915-16	29,230 ..	10,066
1917	118,229 ..	37,694
1918	106,458 ..	54,280

* This was all disposed of locally.

NITRATE OF SODA IN COTTON CULTIVATION.

Experiments over several years have emphasised the great and paying value of this salt in cotton cultivation. The following is the best way to apply the manure:—

The land should be clean. Before sowing, eight or nine good loads of cattle dung should be applied, when the cotton may be sown in the usual manner. In the early spring, the salt should be applied at the rate of one maund (80 lb.) per acre. This quantity is applied at about 5 to 7 inches from the lines of cotton plants, on both sides of the line, and worked in to mix the salt with the soil, and kill off any weeds. The effect of the salt will be noticed in a day or two by a dark-green colour of the leaf. The manure will be of most value in stimulating the growth of plants which have been checked by too much water in the soil.

It should be borne in mind that the most economic use of manure of all kinds is associated with good cultivation of the soil. The better the preparatory tillage, the more marked will be the gain from its use.—"Agricultural Gazette," Nagpur, India.

WINTER CEREAL EXPERIMENTS, 1918.

The Manager of the State Farm, Bungeworgorai, Roma, has forwarded to the Director of Agriculture the following report on the Winter Cereal Experiments conducted during the year 1918:—

"WINTER CEREAL EXPERIMENTS, 1918.

"*Meteorological Conditions.*—The last of the 1917 wheat crop was not harvested until December, operations having been delayed by the unfavourable weather. During January it rained continuously, which prevented all cultural operations from being attempted, but resulted in the subsoil receiving a thorough good soaking, which was the principal factor in bringing about the yields obtained. With February came a change, only 45 points being registered. This continued throughout March and part of April, and for a period extending over seven weeks only 80 points of rain fell. These conditions enabled the preparation of the seed bed to be pushed on with, and by the usual sowing period it had been got ready. In the latter part of April a steady soaking rain was experienced, 262 points being registered, which was most opportune, coming as it did at the recognised time for sowing the main crop. This was followed by a protracted dry spell, May, June, and July together recording only 31 points. In August 165 points were experienced, but the manner in which it was distributed precluded much benefit from being derived.

"No further rain of benefit to the crops was experienced, the next registration being 25 points on 26th October, by which time most of the crops were ready to be harvested.

"*Frost.*—During September, frosts were experienced which wrought more or less damage according to the state of growth and situation.

The following is a tabulated list of the rainfall:—

Month.	Wet Days.	Highest.	Lowest.	Total.
		Points.	Points.	Points.
January	14	250	2	876
February	5	15	2	45
March	1	52	52	52
April	5	220	1	291
May	2	4	1	5
June	1	2	2	2
July	1	24	24	24
August	7	41	1	165
September	—	—	—	—
October	—	—	—	—

"It is evident that the fall of 196 points experienced during the period the crops occupied the ground was not sufficient in itself to be of much value, even if it had fallen in a manner to confer the maximum benefit, which, as will be seen by the above, was not the case, and had it not been that goodly stores of moisture had been conserved in the soil from the rains experienced in the beginning of the year, nothing like the yields which, in some instances reached 24 bushels to the acre, would have been obtained. (See 'Queensland Agricultural Journal,' March—'Wheat Growing Notes.')

"*Manurial Experiments.*—These were not carried out during 1917, and with the exception of Blocks 1 and 2, were bare fallowed.

"The following cultural operations were carried out between the removal of crops in 1916 and sowing in May, 1918:—

"Cultivated in January, 1917, ploughed in March; cultivated in October, ploughed in February, 1918; and cultivated again in March. Harrowing was carried out thrice—just before and immediately after seeding, and once during growth of the crops. It would undoubtedly have been better if the ground had been springtoothed subsequent to the rain experienced in April, as the surface was so consolidated as to prevent the drill entering the ground sufficiently deep to cover the seed in many places. Wherever the grain was so deposited it failed to germinate, resulting in a thin stand and weeds being present.

"The blocks, thirteen in number, of an area of ¼ acre each, were sown with Budge No. 1 during the first week in May, at the rate of ½ bushel to the acre. The plants appeared during the second week in May, and the grain was harvested on 7th October.

"The following are the details in connection therewith:—

No.	Manure.	Cost of Fertiliser per Acre.	Yield per Acre.	Remarks.
		£ s. d.	Bushels.	
1	Shirley's Cereal Manure, No. 1— ½ cwt. to acre	0 4 9	17·2	Cropped 1917; soil sandy loam; crop fairly thin; little flag; even height—2 ft. 9 in. to 3 ft.; slight trace of rust; about a quarter of the block, situated at the east end, was very poor.
2	Shirley's Cereal Manure, No. 1— 1 cwt. to the acre	0 9 6	19·1	Remarks as applied to Block 1.
3	Shirley's Cereal Manure, No. 1— ½ cwt. to acre (top dressing omitted) ..	0 4 9	21·4	This and the subsequent blocks were bare fallowed in 1917, the benefit of which is apparent in the fact that, although only half the manure used in Block 2 was applied, the yield per acre was 2 bushels greater; soil similar to 1 and 2; crop fairly even, 2 ft. 9 in. to 3 ft. high; trace of rust.
4	Unmanured (control)	..	17·6	Soil similar to 1, 2, and 3; crop uneven; thin, short heads; 2 ft. 4 in. to 2 ft. 9 in. high; traces of rust.
5	Superphosphate, 1 cwt. per acre	0 7 0	18·5	Crop fairly even; soil more clayey; grain failed to grow over a portion of the area; very badly infested with sow thistles; height, about 2 ft. 9 in.
6	Thomas's Phosphate (1 cwt.)	0 5 6	18·7†	Fairly even; grain failed to germinate on clayey patches; weedy; height about 2 ft. 9 in.; slight trace of rust; a little more flaggy, due to differences in the soil.
7	Stable Manure, 15½ tons (last application 1916) ½ cwt. Superphosphate	2 5 6 0 3 6	22·1†	As has usually been the case, this block looked well throughout the growing period, being darker and more healthy in appearance than most of the others; germinated fairly well; better than other blocks on the same class of soil; crop fairly even; flaggy; not so rank as in previous seasons; height about 3 ft. over bulk of block; rust in evidence.

No.	Manure.	Cost of Fertiliser per Acre.	Yield per Acre.	Remarks.
		£ s. d.	Bushels.	
8	Superphosphate, 1 cwt. per acre (top dressing not applied)	0 7 0	18·3†	Soil uneven, resulting in uneven crops; grain failed to grow over a portion; weedy; height, from 18 in. to 2 ft. 9 in.; rust in rank patches.
9	Sulphate of Potash, ½ cwt. Nitrate of Soda, ½ cwt. Superphosphate, 1 cwt.	0 8 0 0 6 9 0 7 0	14·1	The soil in this block is also very uneven, ranging from a sandy loam to a stiff clay; the growth in consequence of this was very uneven, as was also the grain; a goodly portion failed to germinate, which, in conjunction with destruction wrought by birds, reduced the yield considerably.
10	Dried Blood, ½ cwt. Superphosphate, ½ cwt. Sulphate of Potash, ½ cwt.	0 4 6 0 3 6 0 8 0	15·2†	Remarks as applied to block 9.
11	Unmanured		14·1	This block contains the greatest soil variation within its boundaries, with the result that the crop was very uneven; on the claypan it only reached a height of 14 in., whereas on the loamy soil it was over 3 ft.; germination very poor; rust was noticeable in rank places.
12	Dried Blood, ½ cwt. Thomas's Phosphate, 1 cwt. Sulphate of Potash, ½ cwt.	0 4 6 0 5 6 0 8 0	16·4	Soil slightly better than in Block 11; crop uneven and weedy; germination poor.
13	Dried Blood, ½ cwt. Sulphate of Potash, ½ cwt Superphosphate, 1 cwt.	0 4 6 0 8 0 0 7 0	12·9	Remarks as applied to Block 12; height, 18 in. to 3 ft.; birds destroyed a fair quantity of grain.

† Pre-war prices have been quoted.

COTTON NOTES.

[NOTES IN CONNECTION WITH A DEPUTATION THAT WAITED ON THE MINISTER FOR AGRICULTURE AT THE DEPARTMENT OF AGRICULTURE AND STOCK AT 10 A.M. ON FRIDAY, 7TH SEPTEMBER, 1917, IN CONNECTION WITH THE COTTON INDUSTRY.]

The deputation, which was really a sub-committee of the Brisbane Chamber of Commerce, consisted of Messrs. Bell, Symes, De Little, Pixley, Tunley, and Weatherhill (secretary).

Mr. Bell: We are really a section of the Brisbane Chamber of Commerce and have come to see you on the question of the cultivation of cotton in Queensland. We have given this matter some thought and consideration, and have come to the conclusion that the co-operation or assistance of the Government is necessary for success to be obtained.

Mr. Lennon: It is already receiving assistance from the Government, and the production of cotton has been trebled this year.

Mr. Bell: We want the Government to co-operate and, if possible, extend it still more. We realise it is a very important industry, and think it will be a very valuable adjunct to the crops on the Downs, and even in the sugar districts.

Mr. de Little: I thank you for the courtesy extended in receiving this deputation at such a busy time of the year. As a pastoral and agricultural standing committee of the Chamber, we realise that the Department has done admirable work in promoting the cotton industry by making advances, ginning the cotton, supplying seed free, and the admirable pamphlet by Major Boyd, which gives such information to the grower. The possibilities of the industry seem very good, and we want to assist the Department as much as we can. Perhaps as a commercial body we may be more interested in the secondary industry than the primary, but in any case we are anxious to see the industry go ahead, and the erection of cotton and oil mills gone on with. In 1871 there was over £80,000 worth of cotton shipped to Manchester.

Mr. Lennon: That was under the facilities offered by the bonus.

Mr. de Little: The farmers don't seem to have grasped the importance of the crop yet.

Mr. Lennon: The last two or three months there have been more applications for seed than for years past.

Mr. de Little: I am interested in it at Remilton. One suggestion we were going to make was that the Department might procure and issue a short and concise pamphlet based on the one already in circulation, and with perhaps a little later information. We received information, for instance, the other day from the munitions factory at Mount Morgan, which shows that a man can pick up to 150 lb. of cotton a day. If you could secure a short pamphlet of a few pages, the farmer might read it where he won't read a long one. It might also be assisted by lectures in the principal centres, pointing out that there is always a market for it, that the Government have found a market, and that it is the easiest crop to grow and pick; a very valuable crop which never fails.

Mr. Lennon: One distinguishing advantage is that in drought times it is a good fodder.

Mr. de Little: There was a man in Capella with a few hundred sheep and not a vestige of grass, but he had cotton growing, and fed his sheep on it—the next year he had a good cotton crop and a good wool crop too. It is stated in the pamphlet that a gentleman came from America and was so much taken with the cotton, climate, and soil that he reckoned it was unsurpassed by any cotton belt in the world, and it was his intention to return to Queensland and bring his family with him and go in for cotton-growing. The deterring factor seems the picking. One of the principal reasons for our coming is that the sub-committee have suggested, in order to let the grower be able to pay an attractive wage for pickers, that we approach the Federal Government with regard to a bonus of 1d. per lb.

Mr. Lennon: Have you done that?

Mr. de Little: We were waiting till we saw you.

Mr. Lennon: The matter has been discussed by the Advisory Committee of the Bureau of Science and Industry in the way of offering money for an effective cotton-picker.

Mr. de Little: If a picker could do 150 lb. at 1d. per lb., that would be 12s. 6d. per day. The grower could give 1½d. per lb., seeing that the Government expect to give about 3½d. per lb.

Mr. Lennon: We are selling at 11d. per lb. this year as against 7d. last year.

Mr. de Little: It is hoped by the Chamber that the local consumption will in the near future overtake the production, and then consideration of the erection of mills will come up. Mr. Tunley will know more on that subject than I do. I understand

the machinery from the old Ipswich mills has been removed. With regard to the bonus, we would like to hear your ideas. Some of the sub-committee think the industry should be able to stand on its own bottom. There are such vast possibilities in the industry. The war and the submarine have given the industry protection for some time to come, and this appears to us an opportune time to push this industry for all we can. It was brought up before the Chamber of Agricultural Societies, to get delegates to try and induce farmers to put in a few acres. The season for planting is from now till November, and we want to push it along. The object is to discuss the matter with yourself, the Under Secretary, and Major Boyd (I believe no one in Queensland knows more about cotton-growing than he does), to see if lectures could be given in the various centres and try to get the farmers to put it in now; also with a view to having your opinion as to whether it would be advisable to approach the Commonwealth Government for a bonus.

Mr. Lennon: Before Federation, there was a standing offer of a bonus paid to some firm in Ipswich, but cotton goods under our Australian tariff are almost free, and cotton in Queensland has to compete with American cotton, where there is cheap labour.

Mr. Tunley: I can't add much as to the position. About seven years ago I was responsible for the last attempt to establish cotton-growing. We bought the mill about 1907 (Joyce Bros. Ltd.), and our experience fully bears out what has been said regarding Queensland as a cotton-growing centre. We had expert advice from America. A great obstacle was the ignorance of the farmers—a sort of prejudice that had to be broken down. The fact that some lost a few shares in the Ipswich mill twenty years earlier was a fatal objection. There was a fairly large amount grown, but the only way I could do it was to go round and visit the farms. I would see a man with a kerosene tin. He would put the tin at the end of the row and go along till he got a handful of cotton, then he would walk back and put that in the tin; then he would walk off and repeat the performance, and say the job was not satisfactory. I would then explain that too much time was taken in walking to the receptacle and back, and try to make him see where he could save time and exertion. We put in a little patch of cotton in the mill grounds, and when the mill was idle we would turn the boys and girls in to see what they could do in picking cotton, and we found they could do an average that would represent 24s. a week if they had been picking all the time—that was at ½d. per lb. for picking, the amount usually paid in America at that time. We got an American picker out, and sent him to Capella to harvest a crop there. He was able to pick it at the rate of 300 lb. a day, but that could not be kept up for any length of time, for it was under "gilt edged" conditions.

Mr. Lennon: 300 lb. a day?

Mr. Tunley: That was the case with all the bolls ripe. He was picking with both hands, and took the leaves out with his teeth, &c. Wherever the growing was taken up enthusiastically it was a success. In February and March—the dry times—cotton would roll in fast. The farmers with us found that conditions which would kill the other agricultural crops were the best for cotton. Another advantage to Queensland is that cotton grows on perfectly poor soil. Plenty of sunshine and rain and poor soil are an advantage in this way for Central Queensland. In America the frost is sufficiently severe to kill the plants, but in Queensland it is just sufficiently severe to prune them, and practically two crops are the result in Queensland to the one in America. All these conditions quite convinced us of the immense value of the industry to the country. We kept on longer than we would have done for our pocket's sake, for the institution of a good industry. We lost on the manufacture through the freetrade and the cost of importing skilled workers from England, and a good deal over the wages they were getting in Manchester had to be paid, while we had a smaller production because we worked forty-eight hours instead of fifty-four, and had to admit Manchester goods in competition. All of these factors killed us from the manufacturing side.

Mr. Lennon: Did not your firm reduce its operations to the manufacture of cheesecloth, &c.?

Mr. Tunley: We made the stock that we use in our own business, such as the coverings for meat. The sewing-cotton was very good, too, and it was mainly used in our own business. We found the quality of the Queensland cotton very good indeed in comparison with the American. If we had been able to handle a hundred times the amount of cotton we would have been able to make it pay without the assistance of the bonus, but our organising expenses on the amount we had to handle were too much without the assistance. We spent a considerable amount of money each year in doing work we thought your Department could have taken up on its own shoulders —pamphlets on cotton, clerical work *re* the bonus, &c.; and in fact we were a sort of general utility. I also went among the farmers and have spent many months driving round from one farm to another, talking cotton, giving away free seed, &c.

That was a fairly heavy cost. The last full year we had we spent £127 in pure propaganda work, postage on circulars, pamphlets, my going round, &c., but not counting any allowance for my time—merely out-of-pocket expenses in bringing the claims of cotton before the farmers. We threw the mill open on Friday afternoons to the school children of Southern Queensland, and I would give lectures and take them through. Then we offered prizes for an essay on cotton-growing, &c., and children grew small areas of cotton, &c. Our present interest is purely academic as a firm.

Mr. Lennon: I just referred a while ago to the fact that I thought the Commonwealth Bureau were engaged on the question of a cotton-picker—I get copies of the reports of the Committee for the State, and one report of the 19th July of last year is on "Cotton and a Mechanical Cotton-picker." Up to the present I think they have not yet decided that an effective cotton-picker is in existence. We are making inquiries in America, and if we can get an assurance from there, I am prepared to import a machine to give demonstrations throughout the State.

Mr. Symes: You are guaranteeing next year a minimum price for cotton, I think.

Mr. Lennon: We are advancing 2d. per lb.

Mr. Symes: The position that appears to me is that there are enormous possibilities in cotton-growing. Our farmers, if they are going to specially cultivate, must have some guarantee ahead of this year.

Mr. Lennon: How are we going to make it a permanent thing? We can only guarantee a market if the Commonwealth help it.

Mr. Symes: If you can guarantee it for three years, say, that would be doing a great thing for the State, and you would be giving them almost a State bonus.

Mr. Lennon: It would be a bonus if it resulted in any loss.

Mr. Symes: I think it would be a great test so far as the industry is concerned, and that the State should stand the expense.

Mr. Lennon: I am inclined to agree with you.

Mr. Symes: It would be a great thing for the Department if they could prove that cotton could be grown successfully. We could then go to the Commonwealth and say, "This is a great industry; you must protect us." If you could say that you could protect the cotton-grower for three years, and a pamphlet could be immediately sent out through your Department to the farmers in the cotton-growing areas in Queensland—a simple pamphlet, pointing out that he will be protected for three years, and giving information in regard to planting, &c., that he would easily understand—I am quite satisfied that there would be an immense response. It is no good telling the farmers to plant vast areas of cotton and then have no market.

Mr. Lennon: I think your suggestion is a very good one, but I would not send the pamphlet to the cane farmers at Cairns. They won't even grow corn for their horses, or vegetables. We would exercise our own discretion by sending the pamphlets where they would be of some use.

Mr. Symes: If you would do that we could probably assist you.

Mr. Lennon: I am glad to see the Chamber of Commerce taking a live interest in the matter. We have been doing what we could, but are not too conceited to receive advice from such a body as yours. You have correspondence through your Chamber that would facilitate our efforts, to a great extent.

Mr. Pixley: I entirely agree with the necessity for propaganda work. This pamphlet of Major Boyd's is an admirable pamphlet, but far too technical for the ordinary farmer to read through.

Mr. Lennon: You remember, Mr. Pixley, when Mr. Girault was brought here to deal with the cane grub in the North, he wrote a pamphlet that would only be of use for scientific societies, but he finally prepared a more reasonable one. I quite appreciate the difficulty you refer to.

Mr. Bell: If you could get the assistance of Mr. Watson, the Advertising Agent, it would be a great thing.

Mr. Lennon: I will get Mr. Scriven in.

Mr. Bell: If the industry were established and were successful during the war, how would we get on after it?

Mr. Tunley: That was the condition after the American Civil War.

Mr. Scriven: I think the question of a three years guarantee requires some thought, especially with regard to the matter of a market after the war.

Mr. Symes: If you are going to form a new industry, the State must pay for the advertising. If after three years it can be shown that cotton can be grown profitably we can go to the Commonwealth and say, "We have proved it, you must support us."

Mr. Scriven: You can.

Mr. Lennon: It is the duty of this Department to help in every possible way to start industries.

Mr. de Little: The Department has done good work so far.

Mr. Lennon: The items we have been making the inquiries about are—cotton-picker, linter, and oil-crushing machinery, &c.

Mr. Scriven: You can freely say you will give an advance of 2d. per lb. for the next three years. It has never been below 2½d. at the final balancing-up.

Mr. Lennon: We will give that guarantee for three years of an advance of 2d. per lb. on the cotton sent in. We give back the whole return to the grower, less the actual cost of labour. There is no charge for the use of the ginning machine.

Mr. Tunley: There is a large amount of cotton imported by Victorian firms.

Mr. Lennon: I don't want machines here that are not effective and that will make me a laughing stock. We only want good ones.

Mr. de Little: Is there not a local invention—a vacuum picker?

Mr. Scriven: To get a machine to take bolls of all sizes is "the rock they are splitting on." They can get them to pick bolls of one particular size.

Mr. de Little: I think it is something on the principle of the vacuum cleaner.

Mr. Scriven: Yes, but it will take a large boll but not a small one.

Mr. Lennon: The nearest approach has been on the lines of a traction engine, and stands right over the bush. It has been pointed out, Mr. Scriven, that Mr. Boyd's pamphlet is very instructive, and gives satisfaction to a number of people, but it is suggested that a similar amount of information, much shortened, might be published in Queensland. Mr. Pixley points out that it wants to be in simpler language, and shorter.

Mr. de Little: It contains separate articles on "When to sow," "How to pick," "How to cultivate," "Choice of soils," &c., and has a good index.

Mr. Lennon: All things going well, Mr. Scriven, don't you think, in proportion to the seed being distributed, that this will be double last year's crop?

Mr. Scriven: Quite.

Mr. Lennon: This year's crop was treble the last one.

Mr. Pixley: How about the area?

Mr. Lennon: That would be hard to tell. As far as planting is concerned I should think 2 or 3 acres would be enough.

Mr. de Little: It is hardly worth putting in less than 5 acres. I have a man on the share system, and he is picking and looking after 5 acres himself.

Mr. Scriven: It is very up-hill work establishing cotton here now. The industry has had four setbacks in the lifetime of people on the land now. The first time was the plantation system which came to grief after the conclusion of the American Civil War. Before then we grew almost as much cotton as wool. Then the Ipswich Cotton Company started, and the industry was going well, but it came to grief. Then Joyce Bros. started, and they were paying expenses and the Federal Government refused to give them any help, and they could not compete against the imported article and down it went again. All this has happened within the knowledge of the present agricultural population, and it is difficult to get the people to think it is going to be successful.

Mr. de Little: The submarines have given them protection, and no manufactured cotton articles will be coming in till after the war. You are quite able to offer 2d. per lb.

Mr. Lennon: Yes, that is decided. I think the Commonwealth Government has been approached to offer a bonus for the invention of a picker.

Mr. Scriven: I think it has been submitted. The Council here have a committee, of which Mr. Norman Bell is one, to try and get a picker. The trouble is to get a picker to tackle all sizes. That is the cause of failure of the American pickers, so far as we can learn.

Mr. de Little: Mr. D. Jones is inventing a machine to pick 200 lb., and men at Mount Morgan have done 150 lb., so there won't be much advantage.

Mr. Lennon: I was present at a demonstration and the work was fairly satisfactory.

Mr. de Little: I think the present difficulty is the picking of the cotton. The men who have not tried it and not picked it are told they can't run it without black labour.

Mr. Lennon: Mr. Scriven has practically said the same as I have done, and you will see it has not been unconsidered by the Department. We think we are going on fairly well. We are glad to see the Chamber of Commerce taking an interest and

think if information can be disseminated as broadly as possible it may help it on. I will give consideration to the matter of enlarging the scope of the dissemination of the pamphlet.

Mr. Symes: I think if we could give you an idea of what we thought practical you could cross out, or do to it anything you thought good.

Mr. Lennon: I would be glad to get information from you and we will endeavour to accelerate our speed.

Mr. Bell: You have about 3,600 farmers getting the "Journal," and I expect a lot don't know the "Journal" is in existence. Perhaps a few copies would enlarge the circulation.

Mr. Lennon: If we sent it to the various Chambers of Commerce in the State, they could perhaps send it out.

Mr. Bell: There are Farmers' Unions in the various centres.

Mr. Pixley: There is the Returned Soldiers' Association, &c.

Mr. Lennon: We will hardly send it to political bodies and ask them to distribute it.

Mr. Bell: Is there anything else that occurs to you?

Mr. Lennon: We will be pleased to have anything you can recommend. Example is stronger than precept. I think that most of the members of the agricultural societies get the "Journal."

The deputation then thanked the Minister for receiving them, and they were taken down to see the cotton gin at work.

The increase in the area under cotton during the last four years has undoubtedly been mainly due to the sympathetic interest in the industry manifested by the Minister for Agriculture. It will be interesting to our readers to recall the proceedings of a deputation of business men, who waited upon him in September, 1917, nearly two years ago, and to note what has since then been done by the Department of Agriculture to encourage farmers to grow cotton, if only as a subsidiary crop. We publish in this issue of the "Journal" a brief résumé of the progress of cotton-growing in Queensland.

THE FUTURE OF RAW COTTON.

The "Daily Mail," Brisbane, publishes a letter to a Brisbane firm, under date 7th July, from Messrs. Harrisons and Crosfield, Ltd., Kobe, Japan, dealing with the cotton yarn trade, and with the future of the supply of raw cotton. The firm wrote:—

"During last month we received from Australian branches several inquiries for quotations on cotton goods. In most cases no business resulted, a fact which did not surprise us, and we will endeavour to put before you the various causes that keep the price of cotton goods so high. First, it must be appreciated that the stoppage of orders from Australia did not affect the Japanese cotton market, as was probably expected by you, Japan having larger buyers in other parts of the world, who continued to place orders.

"Now, take the supply of raw cotton. Advices from America state that this year's crop is 10 to 15 per cent. short of last year, much space, previously given to the growing of cotton, having been taken up to supply foodstuffs. We are now advised from the same quarter that excessive rains have caused a further decrease, and reports from other cotton-growing countries all tell of a shortage.

"Since the beginning of this year, countries where attention for the past four years has been taken up by the war, are now turning to commerce and calling for supplies of raw cotton, hence we find that the demand far exceeds the supply. Holders of cotton yarns in Japan are finding it more profitable to stop weaving and sell their stocks of yarn. Naturally, owing to the shortage, we find much speculation going on in cotton circles. Spinning companies are making huge profits at the expense of the manufacturers, who find the position very serious, inasmuch that they are unable to offer prices that will induce business, and many finding themselves unable to carry on are forced to close their factories. The Toyo Spinning Mill held a meeting in Osaka on 20th May, and the directors recommended to the shareholders a 60 per cent. dividend for the term just closed. The Kanagafuchis have just finished their year with a 70 per cent. dividend. These are fair illustrations of the profits being made.

"Owing to the upward tendency of the New York Cotton Exchange, the market here has been rising gradually, and it is only the inactivity of foreign buyers and the cautious attitude of the weavers that keep it from abnormal rises.

"A few figures for comparison will best illustrate the position this year. The highest price recorded in 1918 was during October, when Yen 443 per bale of 400 lb. for yarns of 20 counts was reached. In November this dropped to Yen 360, and in February this year we see prices at Yen 400. On 24th May the quotation advanced to Yen 465, and on 7th June to Yen 480. (One Yen=4s.)

"Forward deliveries have reached a record price, the present quotations for November delivery being in the neighbourhood of Yen 450. It is anticipated here that when stocks in Australia become reduced, buyers will again have to turn to Japan for supplies until conditions in other countries become more settled. If the present position does not improve they will have to pay higher prices for their goods than ever before.

"Taking the general position of supply and demand as a guide, it does not seem reasonable to expect any appreciable drop on this market for some time to come."

THE VALUE OF SHEEP ON THE FARM.

Sheep are valuable on all farms, except those which are low and marshy and, in consequence, subject to disease. Even on these the Romney Marsh breed—which is, unfortunately, not too well understood in this country—will even thrive. Sheep are valuable for many reasons. In the first place, they do not require as much capital to start with as is the case with other classes of live stock. Secondly, they do not require any shed accommodation, and, thirdly, the problem of high-priced and incompetent labour, which is becoming more serious every year, does not need to be considered much in the keeping of sheep. Very little capital is required to start a flock of about 200 ewes. If properly fed and cared for during the winter months, and properly looked after during lambing time, 200 ewes should raise at least 150 lambs. These lambs should be worth at least 10s. a head, and at the end of the first year, with lambs and wool, the owners should have a net income of £100 to £150, and still have his 200 ewes left. Within the past couple of years there has been quite a tendency on the part of dairymen to go out of cows, and concern themselves with sheep, their reason being that they have become disgusted with dairying on account of the scarce, high-priced, and incompetent labour available. In the keeping of sheep the labour question is in a large measure abolished, seeing that they require a very small amount of labour during the greater part of the year. Give the sheep enough grass to eat and all the fresh water that they can drink, put a little salt before them and visit them at least once a day whilst the blowflies are about, and they will look after themselves and make money for you. Of course, there is a time in the year when all the sheep require very close attention. In order to be successful and to raise the largest percentage of lambs the mother ewes must be well looked after. The presence of a shepherd will save the lives of many lambs, and occasionally a lambing ewe. The wages bill in connection with the keeping of sheep is a small item in comparison with what is necessary for other classes of stock. One man can take care of a good-sized flock of sheep, and still not have to be out of bed at 4 o'clock in the morning, as is the case where the milking of cows is concerned.

AS WEED DESTROYERS.

Sheep are valuable as weed-destroyers and in helping to free the land from useless vegetation which nearly always crops up after cultivation. As weed-destroyers sheep have no equal. They are very fond of weeds, and many times they will leave good grass and pick out the weeds. Another important consideration as to the value of sheep on the farm is the undisputed fact that they improve the land on which they graze. It has never been found, though any amount of experiments have been made, that sheep decrease the fertility of the land; but, on the other hand, always improve it. During the last few years South Australian farmers have been forced to realise that they cannot take crops year after year from the soil without giving back to the soil the necessary fertility to enable it to keep up its productiveness. Where this important matter is not realised, an exhausted condition of the soil will soon be evident. No other farm animal is better adapted to keep up a farm in fertility than is the sheep. Manure from sheep is far better and richer than that from other animals, a fact which has been determined time out of number by chemical analysis. Sheep will spread their manure over the land on which they feed more easily than any other stock, and generally leave most of it in places where it is needed, for it is the sheep's habit to select the highest points for a camping ground, and consequently to leave the droppings on bare rises and hills, where they do most good. The day

has long since passed for farmers to regard sheep with dread, as was the case years ago, when a farmer in the Middle North made experiments with a flock, and as they dropped off one by one felt quite a feeling of relief when the last one was dead. He was then heard to explain, in quite a thankful spirit, that they couldn't trouble him any more. During the past ten years it is a fact that every intelligent farmer who has accumulated wealth will frankly state that, without exception, so far as livestock are concerned, he received his best and easiest money from his flock of sheep. It is hardly necessary to say that the class of farmer who makes money out of his sheep is not of the type which allows several of them to be eaten up alive by maggots, and then wonders what on earth has killed them.

Sheep-husbandry is a profitable line of work in any ordinary season wherever farming operations are justified. A man who does not like sheep should never engage in sheep-husbandry, for he will not give the sheep due care, and for this reason the sheep, on their part, cannot give him more than small returns. The men who really love sheep are those who have success with them and reap the largest profits from them. Sheep are easily handled, and more economical gains can be made from the feed consumed by them than from any other farm animal. All farmers who have any liking for sheep should begin in a small way, and if they will give the sheep a fair chance they will soon learn that they are good and easy money-makers on the farm. No breed of sheep will do well under rough treatment, and quick-tempered, harsh (not to say brutal) men are diametrically opposed to the peaceful nature of the sheep. Perhaps no other animal on the farm appreciates and responds to kind treatment more readily than does the sheep. It is quite extraordinary how soon a man who really understands sheep will make a pet of one and generally quieten it until it will do almost anything indicated as a pilot or decoy for working about yards and sheds—"*Garden and Field.*"

PREPARING THE LAND FOR A FLAX CROP.

The popular idea is that flax is a hard crop on the land and, therefore, that it exhausts the fertility of the soil. A study of the root growth of the plant will throw some light on this question. Wheat, oats, or any of the grasses develop a mass of fine, fibrous roots near the surface of the ground, and these all act as feeders of the plant. The flax plant, on the contrary, sends down to the subsoil a single long taproot with very few fibres on it, and, instead of stooling out, as do our grains and grasses, it sends up one straight stem which branches out only when it has attained a considerable height. It is thus apparent that for a flax plant to do well it must have a large amount of prepared plant food at hand to supply its limited root development. This is also borne out by the fact that the crop only takes from 70 to 100 days from seeding to mature, the average being about 90 days.

The heaviest draft in flax culture is made upon the nitrogen of the soil, and this fact, taken in connection with the further fact that nitrogen is more abundant in virgin soils than in those which have been cultivated, explains the greater success of flax culture on new land. Flax has, therefore, come to be looked upon as a new-land crop in the United States, when it does better than any other crop, returning from 10 to 20 bushels of seed and about 1,800 lb. of straw.

There are several ways of preparing such land for a flax crop. Many successful growers in America break up the grass land about 2 inches deep, then cut the sod fine with a disc harrow, and sow, rolling immediately after sowing, so as to leave the ground smooth for harvesting, as the small pieces of sod catching on the guards of the binder cause endless trouble. A greater number of growers prefer to break 3 to 4 inches deep, but their subsequent treatment differs. Some roll immediately after ploughing, and then sow with a sharp shoe-drill. Flax, however, is a crop that likes a good seed bed, and experience shows that extra cultivation will, as a rule, give better returns.

The use of the roller is essential in attaining the best results. If some cultivation is done and fine soil so worked into the sides of the furrow slice, and all pressed down firmly with the roller, the moisture cannot escape unless through the sod. The fine earth acts as a mulch, holding the moisture, thus presenting the best conditions for rotting the sod, which will furnish food for the growing flax crop and not be in the way of another crop in the following spring. A crop of oats following a flax crop is generally found to do well. The quantity of seed to sow is from 28 to 42 lb. per acre. If moisture is sufficient, the shallower the seed is sown the better. Half an inch will do in that case, but the safest way is to sow it from 1 to 2 inches deep. Flax may be sown broadcast, but the drill is generally used.

MORE ABOUT FLAX-GROWING.

We have received from the Department of Agriculture, Nairobi, British East Africa, a very interesting and informative pamphlet, by Mr. Hugh Simpson, Flax Instructor, entitled "Flax as a Fibre Plant," with "Hints on Flax Cultivation and Flax Culture," from which we take the following notes. These will doubtless afford much of the information we have been asked for of late on the subject:—

Flax is partial to no particular climate or country, having been grown in the porthern parts of Russia, and now in Tropical East Africa; also, from the remotest ages, in most other countries of which we have any history. We read of it in the Sacred Volume as raised in connection with barley in the days of the Israelites in the land of Egypt, and by them made into fine linen fabrics.

The wonderful strength and durability of the mummy linens found to-day in the tombs of Egypt, and which must have been made 4,000 years ago, is striking proof of the outstanding qualities of the fibre. War, the great prover, has placed the superiority of linen in an unassailable position. In fabrics for military requirements requiring the greatest strength and durability, this fibre, after exhaustive experiments, was found to be the one satisfactory covering for the wings of aeroplanes. To-day the Allies depend greatly on the North of Ireland for producing flax for aero cloth essentials and surgical dressings.

In pre-war days Russia was the largest supplier of Britain's demand, but with a very ordinary flax. Belgium, from the banks of the Lys, supplied much less, but of a much superior quality. Both of these countries are out of count at present. The demand is greater than the supply, and is likely to be for some time.

B.E.A. can and does supply a flax much superior to the Russian article; and, while it may not be so good as the Belgian article, it is of a quality comparing well with Irish flax, and it is the quality which is in greatest demand.

SOIL AND CULTIVATION.

Flax will grow on nearly every kind of soil with attention and good culture, but some soils are better adapted to it than others.

To produce the best returns, the soil should be brought to a fine state of tilth. Flax likes a deep, fertile, and mellow loam, and on such soils a heavy crop of both fibre and seed may be produced. But, as we approach the water-logged soils—or the very light murrum soils—our chances of success become less, and, on the latter, flax culture should never be attempted. These limits embrace a wide range and great variety of soils, all capable of producing, under proper treatment, superior crops of flax.

To produce the best returns, a system of rotation should be adopted and the soil well cultivated and ploughed to a depth of 8 in. or 9 in. in the autumn, and in the spring ploughed to a depth of 4 in. or 5 in. The finer the soil is made, the better the crop, the more even the growth, and the finer the fibre produced.

ROTATION OF FLAX.

The place in the rotation which I consider most suitable for the flax crop in this Protectorate is on wheat stubble which has been grown after some previously manured crop or after a crop of maize.

By so doing the manure has sufficient time to be decomposed and its elements made available as food for the flax plants. The manure becomes thoroughly blended in the soil by the repeated ploughings and harrowings it receives. In this way a much more even, better yielding finer quality of flax is produced than is possible under other circumstances.

Very good successive crops of flax are grown in this Protectorate; but the result is not so certain and never so satisfactory—the crop being less uniform in length, coarser in quality, and rather more wasteful in cleaning. To a casual observer the crop may appear very good; but a man of experience will look to the great waste that is certain to ensue in the mill, for, as the scutcher holds the "strick" of flax nearer one end than the middle, a great deal of the shorter flax escapes his grasp and finds its place amongst the tow.

Keeping the foregoing observations in view, it is of little consequence what the other crops in the rotation may be; but, as the flax plant delights in change of soil, I would not recommend it to be grown oftener than once in a three-course rotation on the best soils.

As to situation, the only places we have to guard against are high altitudes, bare exposed situations, and the shade of trees. In the latter case, the crop is apt to lodge and lie down and become rusty before it has put on fibre.

SELECTION OF SEED.

The selection of seed for sowing, like everything else in connection with flax management, requires considerable care and attention. A good many farmers appear to think that flax seed is all of one quality so far as its productiveness is concerned. There is just as much difference in the productive quality of flax seeds as there is in maize; and a large proportion of that flax seed which is sold is no more fit for seed and no more productive than maize would be, were all the half-ripe ears shelled and planted with the good ones for seed. No intelligent farmer would ever think of planting such corn; although it might germinate, it would not and could not produce a good crop of grain. So half-matured flax seed cannot produce a good crop of either fibre or seed. But unless farmers raise their own seed in the following way, they will be obliged to take up such as they can purchase, whether it be of good quality or not. My practice has been to obtain the plumpest and brightest seed to be found, then run it through the winnowing machine a few times, and blow out all the light seeds with a heavy blast.

At harvest time select those stooks of flax that grow best and ripen first, and keep them separate from the rest, and save the seed from them for sowing the following season. Continue this practice for a few years with good cultivation, and both the quality and quantity of the seed will be greatly improved and the length and excellence of the fibre very much increased.

Every intelligent farmer will readily perceive the importance of growing his own flax seed when it can be done with so little trouble and expense.

SOWING OF SEED.

The proper time for sowing differs considerably in this country, according to rainfall, soil, situation, and elevation above sea-level. A certain season of the year that would be considered early in one part might be very late 100 miles in either direction; therefore the fixing of a definite time for any locality is a matter for the farmer's discretion.

I would suggest sowing when the bulk of the heavy rains is past, as soon as the dryness of the land and a fine settled state of the weather will admit. Sowing should never take place during rains or when the soil is so wet that it will adhere to any implement.

The proper quantity of seed, if selected according to the foregoing remarks, would be from 70 lb. to 80 lb. to the acre, as some soils require more seed than others. It is safer, however, to sow on the thin side than on the thick, as the latter is very easily laid down by the rain and does not mature fully.

I may state that a little more Riga seed should be sown than Dutch, as the former is rather larger than the latter.

Having ascertained the quantity of seed necessary for the extent of the land to be sown, the ground should be marked out in plots 12 ft. wide, and the total number of pounds of seed divided by the number of plots, so as to ascertain the number of pounds of seed for each plot. The sower, who should be a very careful person and accustomed to sow grain well, should take the number of pounds for the plot into his sowing sheet and proceed to sow, going with a steady measured step, taking small handfalls and throwing pretty high and strong, letting each cast slightly overlap the other, and taking care that too much does not escape from him in the backward swing of the hand. So proceed with plot after plot, giving each its proper number of pounds of seed, until all is finished.

After sowing, the seed should be harrowed in with a very fine light harrow; if the soil be lumpy, it would be advisable to roll the first harrowing, and, after rolling, give a "tine" of the harrow crosswise or in the different direction. By so doing, the flax plants will all have a chance of braiding together. If the soil be light, leave it presenting the rolled surface; but, if heavy, it is better to break the surface again with the light harrow.

WEEDING.

If cultivation has been properly executed previous to sowing the seed, the weeding of the crop will neither be very troublesome nor expensive, and, if the land has been undergoing a course of tillage during the previous crops, it often happens that the operation can be dispensed with altogether; but, should weeds—such as wild mustard, clive, &c.—unfortunately make their appearance, as is often the case, they must be got rid of while the flax is young or before it exceeds 9 in. high.

This work will be best performed by children, as they will be light on the tender young flax. Care ought to be taken that the weeders work facing the wind, so that the breeze may assist the down-trodden stems to regain their position. Moist

weather should be chosen for the operation of weeding in preference to dry, as it is easier for Nature then to repair any damage that may have been done through the bruising of the plants or the exposure of their roots.

If new dams or steeps have to be made, this should be done as soon as the weeding is finished. This allows of them being filled with water and their banks well saturated with water for some time before the flax is ready for retting.

PULLING.

The proper time for pulling is a very fine point to determine, and one upon which even experienced flax-growers do not quite agree, some advocating early pulling on account of the superior fineness of the quality gained thereby, whilst others say that by letting it become rather on the ripe side the increase of weight of fibre more than compensates for the want of quality.

I believe both are correct to a certain extent; and perhaps it is necessary for the development of the various shades and the degrees of fineness in our linen fabrics that this difference of opinion should exist. There is no doubt but that the extraordinary fineness of quality of some samples of flax produced in the old country, and worth as much as from £200 to £300 (sterling) per ton, is chiefly obtained by pulling the crop on the green side. But it is equally certain that this result is obtained by retting the green flax with the seed not taken off, as the oil adds to the lustre and soft appearance. Experience shows that the medium between the rather green and the rather ripe state is that which produces the greatest possible amount of fibre compatible with a marketable quality, and therefore the most profitable state at which to pull.

The medium point is determined first by observing that the seed-bolls begin to turn from green to a light-brown colour, and, secondly, by examination of the stem, the leaves of which should have become yellow for two-thirds of its length from the ground and the lower half divested of its leaves or have them withered and dried up. The examination of the stalk is more to be depended upon in this country than the colouring of the seed bolls, as they do not ripen evenly together; whilst, in some very dry seasons, they turn brown before the stem presents these appearances. The field, however, when viewed, should have begun to assume a uniform yellowish tinge. A combination of all these appearances will indicate the proper period.

About eight or ten boys will pull an acre of flax in a day. They should gather with the right hand, catching it near the middle, and with a firm grasp, not gathering too much at each pull, so as to be able to keep it perfectly even at the root ends.

Great attention should be paid to this keeping of the roots even in its passage through this and every subsequent process, as its evenness in the roots greatly enhances its value to the spinner.

Dry weather is greatly preferred both as affording better facility for drying the bolls and less time is required to get the green straw out of the effects of the sun. The sun is very injurious to flax both before and after retting.

In drying the straw for seed it should be turned each day, so that it gets the sun evenly. Should there be some parts of the crop long and some short, it should be kept separate through this and every operation for reasons before mentioned.

THRESHING OF SEED.

This operation should take place immediately or as soon as possible after the crop has been gathered into stacks or barns, so as to allow of the retting process being carried out.

In removing the seed care must be taken not to injure the stems.

There are, at present, different methods of removing the seed; one is by the use of a rippling comb—a very simple implement with teeth 6 in. long and three-sixteenths of an inch apart. This comb can be screwed on to a plank and the operators work at each side of it. Another system is by the use of wooden hammers.

The most up-to-date method is by the power-driven roller thresher. Six to eight boys are required to work it—one at each end to feed the rollers, and one to hand the "beets" forward to the feeder, and one or two boys to shake the straw and rebind it again. The feeders stand at the end of the rollers, taking hold of the butts of the bundles, and pulling the heads of the bundles through between the rollers; care being taken not to put them in any further than is necessary to mash all the bolls. Passing through a few times will be sufficient to break all the seed-bolls.

This machine, if properly attended to, will thresh from 10 to 15 tons of straw per day.

WATERING OR RETTING OF FLAX.

This is a process by which the vegetable matter connecting the stem and fibre is decomposed by fermentation under water, and this process is the most important that the flax, while in the farmer's hands, has to pass through; for no matter how suitable the soil, or how well it has been cultivated, or what amount of care and skill may have been bestowed on the operation of sowing, pulling, &c., the value of the fibre depends very much on the successful handling of the flax at this stage.

There are, at present, two systems of retting flax in this Protectorate; one is dew or grass retting; the other—the only true way—is water retting.

Dew-retting I do not recommend for this country. In the first place we have not got the fine grass pasture on which to spread out our flax, and, no matter what the dew at night may be, or how hot the weather, the powerful effects of the sun's rays on the straw weakens and burns it up and, when scutching time comes, it is of a weak, dry and harsh nature. It is not evenly retted and is "stripped" and not all of one shade, while it has got that dull leaden colour which is troublesome to bleach.

Water-retting.—The system of water-retting calls for close attention on the part of new and inexperienced flax growers. There are certain methods and rules and indications which practice and experience have proved necessary to bring the crop safely, and in the most profitable fashion, through the process.

The "dams," as I have remarked elsewhere, should be made some time previous and where an unfailing supply of water can be depended upon in the driest season. They are generally made from three and a-half to four feet deep and about twelve feet wide and thirty to forty feet long—according to the quantity of flax straw that can be dealt with in a day. The sides should be cut with a slight slope so as to guard against their falling in when moistened with water. Any farmer who is setting out to grow flax on a large scale will do well to provide himself with at least six or eight of these retting tanks. The choice of position of the dam is fixed by the water supply available, and a shaded, warm situation selected, say, to the lee of a wood in preference to a cold, windy or exposed position. The soil should be of a clayey nature so as to prevent leakage, and the consequent adding of fresh water to supply this loss. Soft water is best for retting flax. River water, or that which has run a considerable distance exposed to the sun and air, should always be preferred; while water impregnated with lime, iron or other mineral substances, is liable to discolour the flax more or less. Soft water is quicker and more certain in its action.

Some farmers think that, to be successful, they must produce flax of a white colour. This is a mistake, as flax of a nice dark shade or silvery "blae" is quite as marketable, if not more so, than the white shade, and it often occurs that the "blae" flax is found to possess more weight, and the fibre of soft silky quality to a larger extent, than the white shade.

In the case of river water it need not be let into the dam until after the flax is placed in. But when spring water has to be used, the dam should be filled with it for a few weeks previous so that it may become softened and warmed by exposure to the sun and air.

Having got all ready for filling the dams with flax, one man stands in the dam and another person hands the butts of flax to the man in the dam, who commences at one side and places a row across it, putting the top ends down and the root ends up, inclined to an angle of seventy-five degrees or more according to the depth of the dam, proceeding thus till the dam is full and taking care not to pack the flax too tight, as this hinders uniform retting. Another advantage gained by steeping with the top end of the flax down is that, should there be any seed bolls left on the flax, these come off when down in the bottom, and the oil extracted therefrom has to find its way to the surface of the water, thus adding to the soft appearance of the flax. When the flax is in the steep it should be covered all over evenly to the depth of two or three inches with water. Some people keep down the flax with wattle or other poles, but I should prefer to use flat stones, being more convenient and inexpensive. When once collected, they can be put up in small heaps beside the dam and used time after time. The weight of the stones should be such as to keep the flax in suspension and not resting on the bottom of the dam.

After flax has been put into the steep it is advisable to make a boy tramp it down in the water for a few mornings at first, as it assists fermentation. If the weather be warm, it will rise a little in about three or four days, showing that

fermentation has commenced and, if this be the case, a few more stones should be added to counteract this tendency. In a few more days it begins to sink. Some of the weights could then be removed so as not to sink it to the bottom of the tank but allow the flax to remain in suspension.

From this time on attention and examination are necessary as, if all is going right, it may be expected to be sufficiently retted any time from the ninth day onwards. When the temperature is cold, or if fresh water has to be added, fermentation is retarded to a certain extent and the process lengthened.

To ascertain when the flax is ready to be removed from the steep, thrust the hand down into the middle of a beet. If it feels hard and wiry to the grip the examination may terminate for the time being. Repeat from day to day until it begins to feel softer to the grip.

A beet should be taken out from different places in the dam, opened and a few stems taken out and bent over the fingers of the left hand about four inches between the bends. If the woody part only bends, and does not break freely, and there is no appearance of loose fibre becoming detached from the stem, then it must be replaced and examined in like fashion till it be found that the medium-sized stalks—not the finest nor the coarsest—when broken at any place on the stalk allow the shove or bone of the stem to be extracted easily without injuring the fibre. Take hold of the fibre with the fingers and pull it downwards, doing this on several stalks, and if all, or most of them, pull out without breaking or tearing the fibre adhering to the shove, then the proper time has arrived for emptying the steep. If taken out at the time indicated by the above tests and appearances, and after draining for an hour or two on the banks, it may be drawn to a field for spreading out and drying.

Although the process of retting is, from its quickness of action in some cases, the most critical that the fibre has to undergo yet, with a little experience, it becomes a very easy operation to conduct safely. The tests are so simple, practical, an easy of application, that even the beginner need have no fear nor hesitation in undertaking it.

In a great many districts, I find that the majority of flax is spoiled from under retting. The inexperienced person, in his attempt at retting, becomes oppressed with a fear that he is allowing the process to go too far and all will be lost. He thinks the process will go on whilst the flax is being dried in the field. This is false, and no exposure on the spreading field can make up for watering, as, here again, the effects of the sun weakens the fibre.

Far better is it, should one have taken out the flax a day or so too soon, to let it remain in a rot-heap along the side of the steep for a day and a night before spreading.

When the flax is overwatered, there will be a waste in scutching, a great deal of the fibre becoming tow, but what will remain will be of a very fine silky appearance. When underwatered, the same waste will take place in the mill, an increased amount of power must be employed to free the shove from the fibre, cutting a great deal of the fibre away to tow. Further, what remains is "harsh" and coarse in quality.

A second lot of flax should never be steeped in the same water as a previous lot. This is a point which has been overlooked by a good many people. Such persons are apt to think, too hastily and without due consideration, that, as a matter of course, fermentation will take place more quickly in sour water than in fresh. But practice shows the reverse, and old flax water should not be allowed to sit in the bottom of the dams.

When running off flax water, it should not be allowed to get in contact with a stream of water which may have to be used for drinking, as this water contains poisonous matter in it. It does possess considerable manurial qualities, and could advantageously be run over grass land.

[TO BE CONTINUED.]

GRAIN FOR SALE.

SEED MAIZE.

To growers desirous of obtaining supplies of pure and reliable strains of improved seed, the following varieties are being offered and represent limited stocks raised from selected strains of Departmental seed:—

Yellow.—Improved Yellow Dent, Star Leaming, Reid's Yellow Dent.

White.—Boone County White.

CONDITIONS OF SALE.

Applications for seed, with accompanying remittance (exchange added) should be addressed to the Under Secretary for Agriculture, Brisbane. (*Postal address and name of railway station should be given.*) It will be taken for granted (unless otherwise specified) that a similar type and kind of grain to the one ordered can be sent as a substitute. This provision applies only in cases where orders exceed the available supply of seed.

Sales are limited to three bushels to any one applicant.

Advice will be sent when seed is despatched.

Purchasers are requested to write promptly after receipt of seed should any matters require adjustment.

PRICES.

To enable applicants living at a distance to benefit, a flat rate of 15s. per bushel is being charged. This price includes all railage to the nearest railway station, but where steamer freight is necessary this and any charges in relation thereto must be paid by the purchaser, and the cost thereof added to the remittance.

Fifteen shillings (15s.) per bushel.

DESCRIPTION OF THE ABOVEMENTIONED VARIETIES OF SEED MAIZE FOR SALE.

Reid's Yellow Dent.—A medium early maturing variety of four months habit, averaging from 8 feet to 9 feet high. A prolific bearer, carrying a fair amount of foliage, though inclined to produce suckers or off shoots when sown on rich soils, and grown under very favourable conditions. The ears are borne midway on the stalk on a somewhat pendulous shank causing the ear to turn

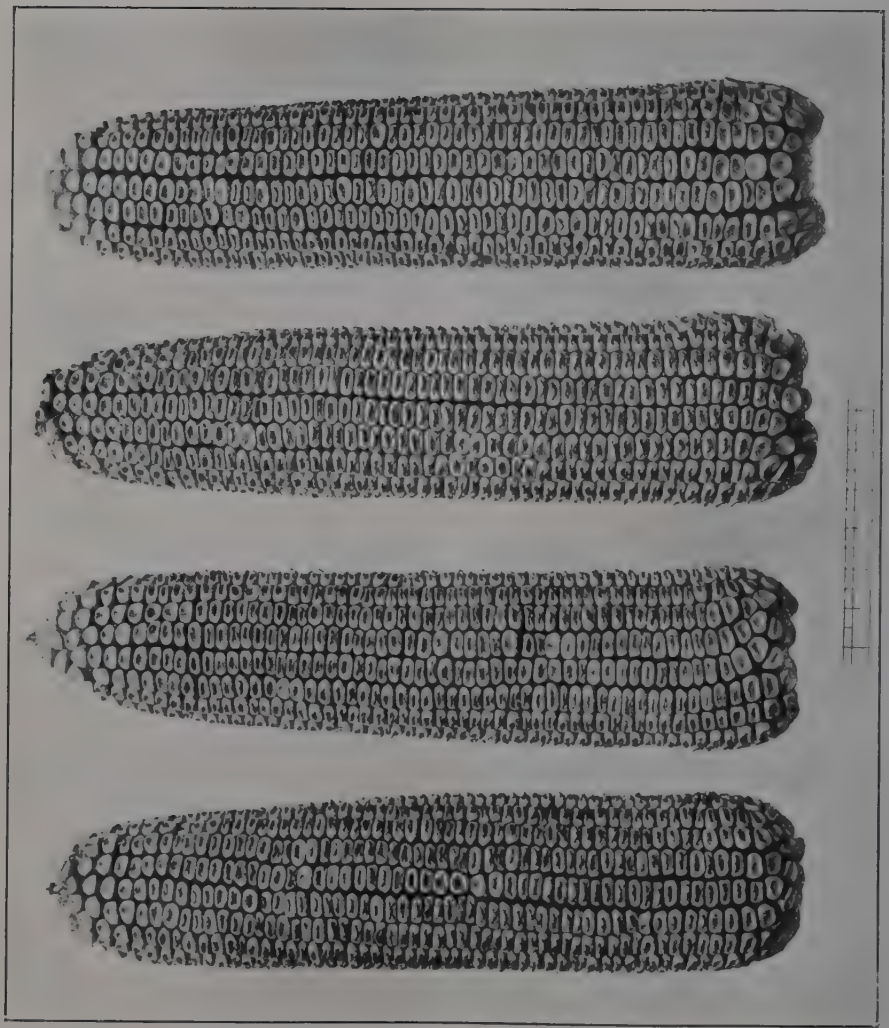


PLATE 6.—BOONE COUNTY WHITE.

down and so ripen off early. They are of good size, from 9 inches to 10 inches long, cylindrically shaped, carrying from 18 to 22 rows of tightly packed grain—a feature characteristic of this variety—showing the improvement effected by consistent selection. The grain is of medium size, block wedge-shaped in appearance, light golden colour with a dark amber base, medium hard character with a slightly rough crease dent. The cobs or cores are of red colour and of a hard nature.

This variety readily adapts itself to new conditions, and has proved a useful one where early crops are desired. Good results have been received from crops grown on the coastal belt and as far west as Roma.

Boone County White.—This is one of the heaviest yielding white varieties grown, and one that readily adapts itself to new conditions. A medium season variety, somewhat earlier than most maize of this type, taking from four to four and a-half months to mature. A fairly prolific bearer and a consistent yielder. The ears are exceptionally large, from 10 inches to 12 inches, and of large circumference, cylindrical in shape, carrying from 16 to 20 rows of tightly packed grain; being pendulous in habit, it is inducive to early ripening. The grain is of medium size, solid block wedge-shaped type of a hard, horny texture, wth a light starchy tip leaving a slightly rough dent. This variety has undergone considerable improvement, proven by the consistent yields obtained, and is recommended for areas contiguous to the coast.

Star Leaming.—This variety is but a new one to this State, though different strains of Leaming have been grown for many years past. Like the "Early Leaming," its habit is a very early one, which makes it important where seasonal conditions only admit of short season crops being grown and where early crops or catch crops are desired. It may be classed as a very early maturing variety from three and a-half to four months, of short, sturdy growth, from 6 feet to 8 feet, carrying abundance of foliage, and a characteristic bushy tassel producing quantities of pollen. The ears are of medium size, from 8 inches to 9 inches long, weighty and compact, carrying from 16 to 20 rows of well packed grain, being not unlike Reid's Yellow Dent in this respect; these are borne rather low on the stalk, semi-erect in habit, protected by a light close-fitting husk, rendering it an exceptionally easy variety to harvest. The grain is of medium size, stout block type, wedge-shaped in appearance, and of fairly hard nature, with a rich amber base and a distinct yellow soft tip cap, the grain possessing a rich golden colour. From consistent results obtained, this variety has many outstanding merits which rank it amongst the first of the short season kinds.

Improved Yellow Dent.—This is perhaps one of the best known and most extensively grown variety in this State. Numerous strains are met with in nearly all districts, all more or less emanating from the original "Yellow Dent." This variety has for many seasons undergone considerable improvement, and a type suitable to meet many of the State's requirements is now being offered. "Improved Yellow Dent" may be classed as a medium-late maturing variety, from five to five and a-half months, a strong, prolific grower, from 10 feet to 12 feet high, capable of giving large returns both of grain and fodder. The ears are of medium size, 8 inches to 10 inches, stout, cylindrically shaped, borne somewhat high on the stalk, semi-erect in habit, being well protected by a strong, tight, close-fitting husk; they are usually well filled, carrying from 16 to 18 rows of grain packed on the cob. The grain is of a rich amber colour, with a yellow tip cap; of medium hardness, and of a deep, flattened wedge-shaped appearance. The core is usually of a pink colour. This variety adapts itself readily to varying conditions, and has given splendid returns in many of the maizegrowing districts.

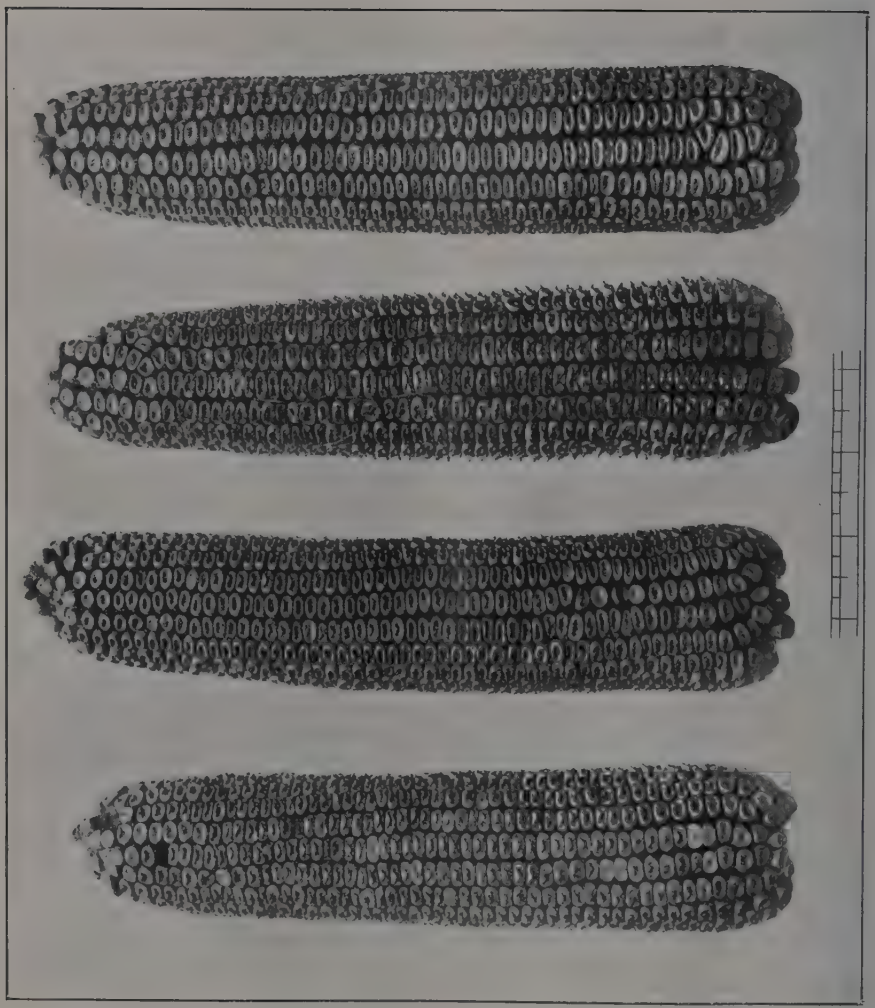


PLATE 7—STAR LEAMING.

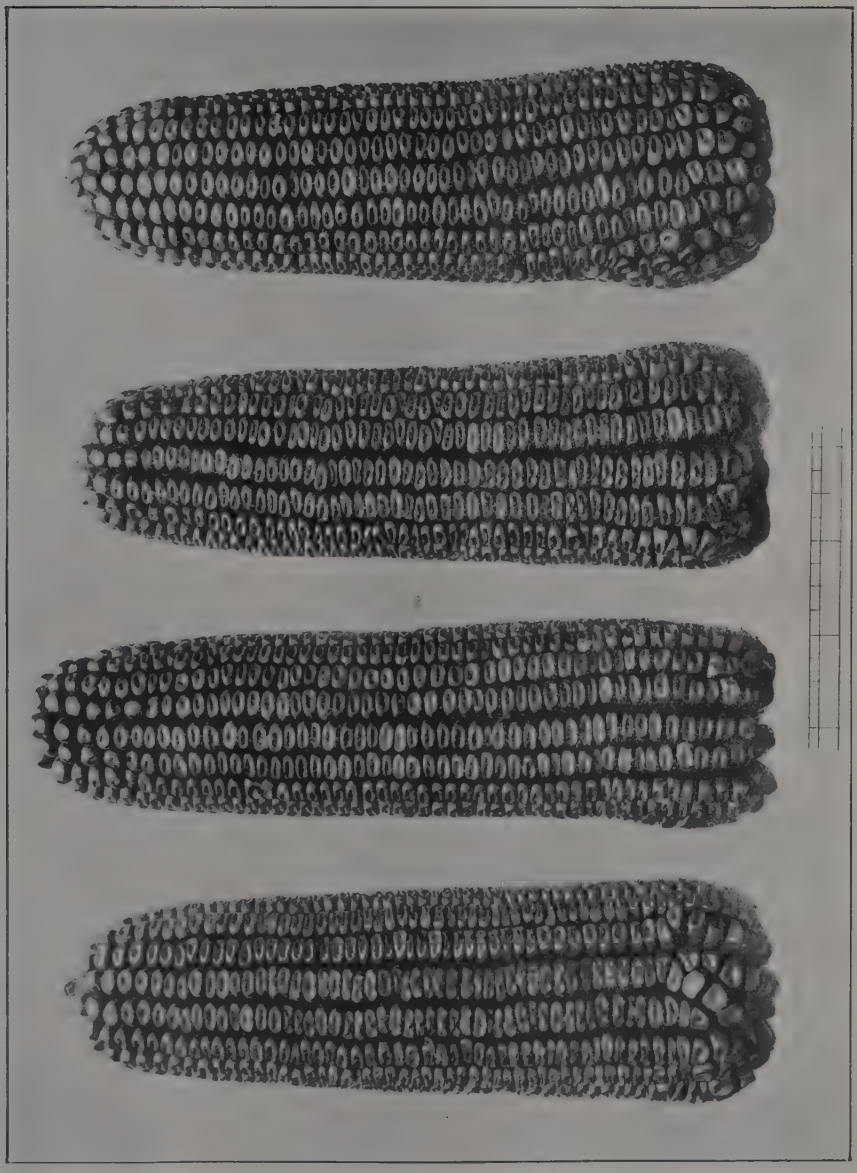


PLATE 8.—IMPROVED YELLOW DENT.

Reid's Yellow Dent.

Boone County White.

Star Leaming.

Improved Yellow Dent.

PLATE 9.—SEED MAIZE.

MARKET GARDENING.

BEANS.

There is a considerable variety of beans for gardening purposes. These comprise French or kidney beans, including the stringless butter beans, pole beans, scarlet runners, broad beans, and lima beans. All these are annuals, except lima beans, which are perennials in districts where there is no severe winter cold. French beans may be grown all the year round in many parts of Queensland, but where frosts prevail the season may be reckoned from the middle or end of August until April or May. During these months, successive sowings may be made at intervals of two or three weeks when the ground is not too dry. Any good garden soil will grow French beans, but the best crops are obtained from good loams or alluvial soils. The drills should be a few inches deep, varying from 2 to 4 inches, according to the weather and the state of the soil. Make the rows 3 feet apart, and put the seed at least 6 inches apart in the rows.

Should the soil be very dry, water it well before sowing. The beans should be gathered as they become fit—that is, while young and tender; and, unless it is desired to save some for seed, they should not be allowed to ripen, as, thereby, the bearing power of the plants will be considerably lessened.

Pole or runner beans are summer plants, and may be sown from September to February or March. The rows for these should be 4 or 5 ft. apart, and, before planting, poles about 6 ft. long should be set up along the rows at a distance of 3 or 4 ft. apart. Around each pole plant 6 or 8 seeds, 2 in. deep, and when they come up thin them out, leaving four of the strongest plants to each pole. It may sometimes become necessary to tie the young tendrils to the poles at first, but as soon as they begin to run they will twine around the sticks naturally without any artificial help. Broad beans do not succeed well in the hot weather, their season being from March to September. Sow in drills 3 or 4 ft. apart, 3 in. or so deep, and the beans about 9 in. apart in the rows. When the plants come into flower, their tops should be pinched off in order to check the upward growth and cause the beans to set. If this pinching is neglected, in all probability the plants will continue to grow, most of the flowers will drop off, and there will be little or no crop. The beans should be gathered as they become fit whether they are wanted or not, so as to prolong the bearing season as much as possible.

Lima beans are a good crop to grow in the summer months, as they will stand any amount of heat and dry weather, and continue in bearing for a very long time. The dwarf or bush limas are perhaps the best to grow, as they require no poles, and consequently give less trouble. Lima beans may be planted in August or September, and again in November, and will continue to grow and bear until cut down by the frosts of winter. Dwarf limas may be planted in drills 3 ft. apart, and the seeds 18 in. apart in the rows or in hills of four or five seeds 3 ft. apart each way. The seeds should not be planted more than 2 in. deep, and should be placed in the ground edgeways, with the eyes down.

The pole limas require the same treatment precisely as other pole beans. French beans and most of the pole beans are *pod* beans, of which the edible part is the young and tender seed pod. Broad and lima beans, on the other hand, are *shell* beans, the part used for food being the bean itself and not the pod.

All of these, except the lima, must be used when young and tender. The lima bean may be used green (the bean itself, not the pod) or allowed to ripen, and stored for winter use. They will keep for a long time, and only require soaking in water before cooking to render them soft and palatable. They are the most delicious of the pod beans. Lima beans should be more extensively cultivated than they are, because they will succeed in dry seasons when other beans fail, and continue to bear right through the summer.

The varieties of French beans, including butter beans, are very numerous, and each grower must choose what best suits his requirements.

Of the limas, the largest and most delicately flavoured are Burpee's bush lima.

A good manure for beans is a light dressing of farmyard manure, 4 to 6 cwt. of superphosphate, and 1 cwt. of sulphate of potash (or 4 cwt. of kainit) per acre. The use of 2 cwt. of nitrate of soda per acre gives a very substantial increase of crop. An acre so treated has given an increase of nearly 50 per cent. Where 3¼ tons of French beans were obtained from an acre on which no nitrate of soda was used, 4½ tons were gathered on the same area as the result of its use.

Of late years much loss has been sustained by French bean growers owing to the destruction caused by the Bean Fly. On this subject, Mr. E. Jarvis, Assistant Government Entomologist, says:—

"Attempts to cultivate French beans in Southern Queensland are apt to prove more or less unsuccessful, and in some districts it is almost impossible to grow this

vegetable during the summer months. A crop may look promising at the start, but before long the young plants may show unmistakable signs of arrested growth, and become wilted and sickly looking, droop gradually, and at last topple over one after another in a most disheartening fashion.

"In the absence of any decided external evidence of injury, the grower is naturally somewhat at a loss to account for the cause of such failure, and is usually too disgusted to closely investigate the matter. In such cases, however, neglect is never advisable; and specimens of the affected plants, with particulars as to time of sowing and first notice of attack, &c., should be sent without delay to the Under Secretary of the Agricultural Department.

"The above symptoms are not due to climatic changes, or to the presence of fungi, but to the ravages of a small fly, the grubs of which tunnel in the stems and can easily be found if the skin of a badly attacked beanstalk be carefully peeled in places with a sharp pocket-knife. Such treatment will disclose a number of tiny pale-yellow maggots, about one-eighth of an inch long, lying close to the surface; and careful scrutiny will reveal the presence of still smaller, reddish, seed-like bodies, immediately under the dried skin, which are the pupæ from which these destructive little insects will ultimately issue."

The remedies he suggests are:—

1. Grow a small catch-crop of Canadian Wonder beans very early in the season to meet the first brood of flies, and when these plants are found, upon examination, to be harbouring good-sized grubs, pull them up and burn them without delay.

2. Root up and burn all old bean plants immediately they have ceased to become profitable.

This and the preceding method of control are of the greatest importance, and will well repay growers for any trouble or loss of time incurred.

3. Protect the stems by hilling them up with soil until covered. (Mr. Froggatt says that Sydney market gardeners adopt this plan, which, in good growing weather, enables a damaged plant to root afresh above the injured portion.)

A FARMER'S REMEDY FOR THE FRENCH BEAN FLY.

Referring to the Bean Fly, Mr. R. J. Scott, of Wanda, Walla (Mount Perry district), says:—

"My first experience of this fly in the Brisbane district was in the autumn of 1893-4, ten years before the dates mentioned in the article; and I would like to add, for the benefit of unfortunate growers, my plan for combating the fly. Four days, say, after planting the seed, cover the rows with a light layer of sawdust. Then wet this with a dressing of kerosene emulsion with a watering-can. When the plants are in the second leaf, again dress with the emulsion. To make kerosene emulsion, I use 1 lb. of ordinary soap, cut up, and dissolved in about 2 gallons of boiling water. When dissolved, add cold water to 4 gallons and three-quarters of a pint of kerosene, well stirred in with a flat piece of board. The emulsion must be warm when used, and kept well stirred."

This is a very simple remedy, and well worthy of a trial by gardeners and others who frequently suffer the loss of an entire crop owing to the ravages of this fly.

HOW TO MAKE DWARF TREES.

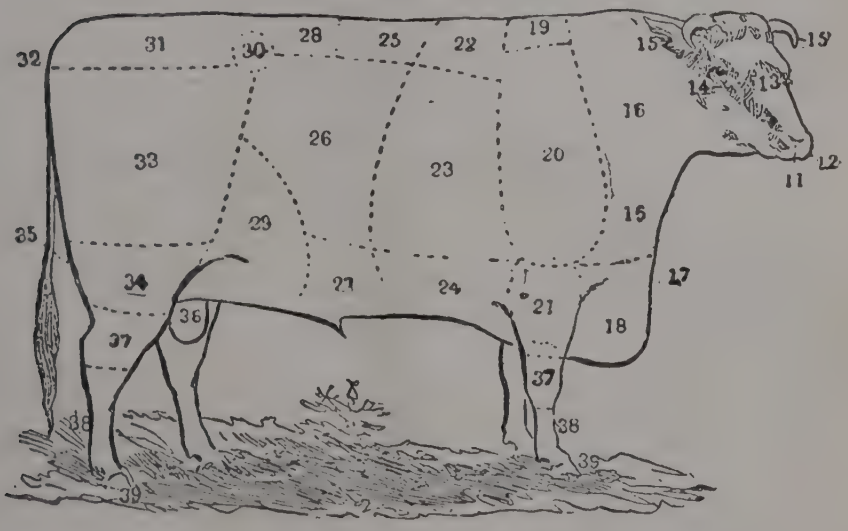
Some years ago there were to be seen on the upper veranda of a Chinese or Japanese business house in Wickham street, Fortitude Valley, three or four dwarfed orange trees in pots, which had fruited freely. From what we could gather as to the method adopted in dwarfing orange and other fruit trees, it appeared that the following method was employed:—Take an orange, and, having cut a small hole in the peel, remove all pulp and juice. Fill the skin thus emptied with some cocoanut fibre, fine moss, and charcoal, just stiffened with a little loam. In the centre of this place the seed or kernal of any tree that it is proposed to get a dwarf from. Place this peel in a vase or tumbler in a window, and moisten the contents occasionally with a little water through the hole in the peel, and sprinkle the surface with fine wood ashes. In due time the seed will push up a stem through the compost, and its roots through the orange peel. The roots must then be cut flush with the peel, and the process repeated frequently for some time. The stem of the tree will assume a stunted, gnarled appearance, making it look like an old tree. When the ends of the roots are cut for the last time, the orange peel which, curiously enough, does not rot, may be painted black and varnished, or the tree may be transferred to a pot.

Pastoral.

POINTS OF BEEF CATTLE.

The late Mr. P. R. Gordon, who, for several years, held the responsible position of Chief Inspector of Stock, in the Queensland Department of Agriculture and Stock, was an acknowledged authority on the subjects of stock and stock-breeding. In one of the valuable publications he placed before stock-breeders was one which will well repay re-perusal, on the points of the Shorthorn Bull, and reads as follows:—

Points of Short Horn Bull.



The plate of a Shorthorn bull, with the points indicated on it, so far as they can be so, is—as was the case with the preceding two—copied from Mr. Alexander Bruce's writings on the subject. In all previous schedules of points of cattle that have come under my observation no attempt had been made to expressly classify the points of, perhaps, the greatest importance from a breeder's point of view—namely, those that cannot be represented by diagram. They have been given special prominence in the following schedule. In working out the schedule, I had before me several scale of points, and in these I found that to restrict the aggregate of points to 100 would be to unduly undervalue many of the minor points, and without departing from the decimal system I have adopted one of Mr. Bruce's alternate aggregates—namely, 250. I have selected the Shorthorn for the purpose of scale of points; but the other beef breeds—namely, Hereford, Devon, and Aberdeen Angus—are so similar that the scale will apply to them, or any other beef breed of cattle.

The first 10 points cannot be shown by diagram.

DESCRIPTION OF POINTS, AND THEIR VALUES.

1. "Pedigree."—According to standard in Herd Book—20 marks.

2. "Offspring."—The character of offspring as shown by their success at shows—20 marks.

3. "Carriage and Style," is that form and carriage at once recognised, with the lines of the body not sharp or abrupt, denoting purity of blood and high breeding—10 marks.

4. "Size."—The preferable size is a medium one approaching to large; extra large animals are, as a rule, less hardy, and require proportionately more and better food—7 marks.

5. "Vigour" is indicated by width of forehead, well-developed neck and horns, roundness and capacity of barrel, and robust and muscular appearance—value, 10 marks.

"Quality."—Which may be described as certain external properties, which may be seen and felt, indicative of high breeding, a disposition to early maturity, and of having the frame, especially in the prime parts, covered with valuable meat, and the fat evenly distributed throughout the whole carcase. Of quality, there are two subdivisions—(1) "General quality," and (2) "Head." In the former sub-division 6 points are allotted, namely:—

6. "Bone."—As shown in that of the leg under the knee, should be fine, but not so fine as to indicate weakness of constitution. Coarseness of bone is incompatible with "quality." In coarse large-boned animals a great proportion of the nutriment in the food goes to making and supporting bone, which in the fine-boned beast is made into meat—value 6 marks.

7. "Colour" should be any variety of red and white, as roan, or red and white, or altogether white. The richer the colour the better; but red inclining to black, or light red inclining to yellow, is objectionable, as well as red and white spotted—value, 4 marks.

8. "Hair" should be fine, long, wavy, silky, and abundant, with soft mossy undergrowth—value, 6 marks.

9. "Handle."—That is, touch and handle.—The quality of an animal with respect to touch is ascertained by a slow, comparatively light, but firm pressure with the points of the fingers on the different parts of the animal, especially along the chine, back, ribs, loin, and rump, and on the hip or hook bones; and if it is in fair condition, and stands well in this point, the feeling under the fingers will be firm, but yielding, which indicates the existence of fat between the skin and flesh, and aptitude to fatten. The flesh itself should be yielding and elastic, especially on the ribs, point of the rump, and at the setting on of the tail. In handling, the thickness and elasticity of the skin must be ascertained. It should be of medium thickness, and not so thin as to indicate that the animal can undergo no hardship; neither should it be loose, but moveable, mellow, soft, yielding, and elastic. Value of touch and handle, 12 marks.

10. "Evenness of flesh and fat."—The meat should be evenly, fairly, and deeply laid on over the whole carcase, especially on the prime parts, and the fat should be fairly distributed throughout the whole. Patchiness on the shoulders, ribs, loin, or rump—especially on the last—is a decided fault in young stock, as the fat, instead of being evenly distributed throughout the carcase, as indicated by the marbled appearance of first-class meat, is largely collected at the patchy parts—value, 7 marks.

In the "Head"—the second subdivision of quality—there are seven points, described as under:—

11. The "Muzzle" should be broad, full, and dewy. The colour should be cream, orange or light drab, but never smoky or black, which indicate inferiority of blood—value, 3 marks.

12. The "Nostril" should be wide, high, and open—2 marks.

13. The "Forehead and Face."—The forehead should be short and broad, denoting vigour, while in the cow it should be longer and narrower. The face should be comparatively short, lean of flesh, and somewhat dished or concave—value, together, 5 marks.

14. The "Eye" should be prominent, bright, mild, lively, and trustful, and the expression should be cheerful, open, gentle, and contented—value, 4 marks.

15. "The Horn and Ear."—The horn should be comparatively short, moderately thick, well-shaped, flattish and waxy, not clean and white, nor blackened, except at the extreme tips. It should incline outwards, and not much upwards,—value, 6 marks. The ear should be large, thin, yellowish inside, erect, lively in action, and hairy—value, 1 mark; total, 7 marks.

"Form" means symmetry and utility of carcase—*i.e.*, a handsome, well-developed, healthy frame, with lines straight above and below, and fulness and largeness in all the prime parts, and smallness in the inferior, or offal.

Of "form" there are four subdivisions—(1) forequarter, (2) middle, (3) hindquarter, and (4) legs; and in the first of these subdivisions—forequarter—there are 9 points, namely:—

16. The "Neck and Throat."—The neck should be clean, somewhat long and arching (bull-necked), which shows strength and masculine vigour, a most essential point; but the rise of the arch of the neck should never extend to the shoulders,

and the neck should be fine at the setting on of the head. The neck-vein ought to be well developed, and should run full and evenly into the shoulder. The throat should be fine, clean, and free from superfluous skin—value, 8 marks.

17. The "Breast."—The space between the forelegs, viewed in front, should be wide, full, and swelling, indicating thickness through the heart and capacity of chest—value, 4 marks.

18. The "Brisket" should be full, deep, broad, and projecting forward in front of the leg, and downwards nearly to the knee. There should be no dew-lap, beyond a slight pendulous thread. Although a deep brisket is not an absolute guarantee of a deep chest, the two generally go together. A deep brisket is not always to be met with in well-shaped cattle, but it is indicative of a propensity to fatten—value, 3 marks.

19. The "Crops"—the top of the shoulder—should be full and well covered with flesh, but not too wide. If they are very thick, straight, and open, the animal will never have good action—value, 4 marks.

20. The "Shoulder" should be well developed, and covered with muscle from its point to the crops. The shoulder-blade should be fairly laid back to ensure action, and a good fore flank. A too upright shoulder invariably entails a protuberant, bare shoulder-point and meagre fore flank—both bad faults—value, 8 marks.

21. The "Forearm" should be broad, large, straight, and muscular,—value, 3 marks.

22. The "Chine"—the space between the crops and back—should be round, and so full as to leave no hollow behind the shoulder. Nothing can compensate for a deficiency in this respect. It takes away substance from one of the very prime parts. The top of the chine should be on a level with and run well into the back—value, 9 marks.

23. The "Foreribs" should be round (hooped), deep and capacious throughout, running down wide and deep to give plenty of room for the heart and lungs. They should especially stand well out behind the shoulder. A bull with bad foreribs and a narrow contracted chest—hollow behind the shoulder—should be set aside, whatever other good qualities he may possess. A well-known authority has said, "There must be ample room for the heart to beat and the lungs to play, otherwise sufficient blood for the purpose of nutriment and strength will not be circulated, nor will it undergo the vital change which is essential to the proper discharge of every function." Deficient in this respect he is literally a "bad-hearted" animal, and his stock will lack vigour of constitution, and be liable to succumb to disease—value, 5 marks.

24. "Foreflank" should be deep and well developed, and should run full and evenly into the shoulder—value, 6 marks.

In the middle subdivision there are five points, described as follows:—

25. The "Back" should be straight and broad, and on the same level as the chine and loin. It should be well covered with flesh, and should run full and wide into the loin—value, 5 marks.

26. The "Back Ribs" should spring roundly in an arch from the back, and run well back towards the hindquarters, so as to leave little space between the ribs and the hips or hooks—*i.e.*, to be well ribbed home (a most essential point), while the two or three last ribs should be broad, arching, and well let down—value, 8 marks.

27. The "Belly" should be neither tucked up nor too low in the middle—that is, "pot-bellied"—but roomy and fairly let down, giving space for a capacious paunch. There should be room for ample materials to keep up the necessary supply of blood—value, 3 marks.

28. The "Loin" should be full, level, broad, and well covered with flesh. When properly developed, it should appear to extend far along the back. It is a prime part of the carcase, besides giving additional strength to the animal; and in moderately fat animals, at least, it is one of the points by which a purchaser is guided in judging as to their condition—value, 10 marks.

29. The "Flank" should be full, swelling, low, and deep. This, too, is one of the chief points noticed by the buyer in judging as to the condition of cattle, and ought for this and other reasons to be cultivated—value, 10 marks.

The Hindquarter subdivision comprises seven points, described as follows:—

30. The "Hip or Hook."—The width, measuring from the crown of one hip bone to that of the other, should be comparatively wide, but not protruding, nor too large. It should be on a level with the loin and rump. The hip bones should be well covered, and feel comparatively soft to the touch—value, 3 marks.

31. The "Rumps."—The length from the crown of the hip to the point of the true rump, and the width across behind from point to point, should be long and wide, square and level on the top, with the space between the hip and the tail and the points of the rumps well filled up with flesh and fat, without patchiness or gaudiness. A wide, long, level, well filled up rump, and a good handle at the tail and haunch, are sure indications that the animal is of the right sort; and these points are also of importance through the meat on them being all of the primest quality—value, 10 marks.

32. The "Tail and Set-on."—The tail should be set symmetrically on a level with the rump, loin, and back. It should be strong and broad at the root, but rapidly tapering to fine and round at the brush. It should, when not raised, fit neatly in between the points of the rump bones. It should neither rise at the root, with a cock or curve, above the level of the rump, nor should it run far up the rump nor droop—*i.e.*, it should be set square on—value, 7 marks.

33. The "Quarter"—the length and width below the rump and above the thigh—should be wide, level, and square. It should come down straight and full to the thigh, but it should not be rounded like that of a horse, which is a sure sign of coarseness—value, 6 marks.

34. The "Thigh" should be broad, strong, short, and well-developed—value, 4 marks.

35. The "Twist"—the filling up between the thighs—should be full, broad, well filled, making the thighs meet low down—value, 8 marks.

36. The "Testes" should be well developed—value, 2 marks.

37. "Knee and Gambril, or Hock."—The fore knee should be broad in front, clean, and well developed. The gambril (or hock) should be long, broad, clean, muscular, and nearly straight to the ground—value, 7 marks.

38. The "Leg" should be short, straight, wide-set, clean, and well proportioned, and under the knee and gambril it should be moderately fine and sinewy—value, 2 marks.

39. The "Hoof" should be clean, short, and well proportioned—value, 1 mark.

Recapitulation.

	Value, Marks.		Value, Marks.
Pedigree, &c.	20	Shoulder	8
Offspring	20	Forearm	3
Carriage and style	10	Fore flank	6
Size	7	Back	5
Vigour	3	Back ribs	7
Bone	6	Belly	3
Colour	4	Loin	10
Hair	6	Flank	10
Handle	12	Hip	3
Evenness of flesh	7	Rump	10
Muzzle	3	Tail and set-on	7
Chine	9	Quarter	6
Nostril	2	Thigh	4
Fore ribs	5	Twist	8
Forehead and face	5	Testes	2
Eye and expression	4	Knee and hock	7
Ear and horn	6	Leg	2
Neck	8	Hoof	1
Breast	4		
Brisket	3	Aggregate	250
Crops	4		

STINKING ROGER AS SHEEP FODDER.

Lately we were asked if the ill-smelling weed known as "Stinking Roger" could be utilised in any way for fibre or stock feed. We had never heard that this pestiferous plant was of any use economically; but the following paragraph in the Perth "Farmer," would lead to the belief that it may be good sheep feed. That journal says:—

"Giving evidence before the Royal Commission on Agriculture in October, 1916, Mr. Maitland Leake, referring to the prevalance of weeds, said:—'There is a farm adjoining us which is entirely overrun with Stinking Roger. It has completely

spoiled his crop with the exception of about 30 acres. . . . . It is good sheep feed and we are keeping it down (with sheep). We have neighbours on either side who have the roger on their land, but it has not affected us because we can keep it down. Sheep do wonderfully well upon it. Mr. Heuston will be giving evidence, and he will tell you how long he has had sheep on the roger, and how well they have done on it. I have been surprised myself.'

"Mr. Heuston, to whom Mr. Leake referred above, gave evidence on this plant later. He said: 'We run 400 sheep at the present moment. We have only been running stock during the last twelve months, but during the last four months 150 acres would carry 400 sheep. That is because of the Stinking Roger weed. I find it very satisfactory feed. Sheep do well on it.'

"It looks as if there was something to be said in favour of even Stinking Roger. Possibly settlers in the very dry areas may even find a welcome for it."

CAN FIBRE BE MADE FROM EUCALYPTUS BARK.

The Perth "Farmer" has the following article in the affirmative:—

From the bark of the eucalyptus trees, which cover millions of acres of Australia, can be produced a fibre which, it is claimed, will make the Commonwealth independent of Indian jute goods and New Zealand flax, save millions of pounds annually from being sent overseas, and create employment for thousands of Australian workmen, while at the same time supplying the consumers with goods at less cost than, but of equal quality to, the imported article.

The originator of this proposition (says an exchange) is an Australian in the prime of life, Mr. W. M. Billings, whose researches and experiments of the past fifteen years on his farm and workshop at Wonga Park have now passed the stage of theory and entered the zone of practical economics. At his model factory on the banks of the Saltwater River at Footscray, near the swing bridge, Mr. Billings exhibited samples of twine, rope, and sacking made from eucalyptus fibre, together with sundry marketable by-products of the industry, which themselves possess potentialities hardly less in magnitude than the primary products of the bark.

The three main essentials in fibre production are declared by Mr. Billings to be fully complied with in his process, namely—the staple is of good length, the product is strong and durable, and the cost of manufacture is low. Indeed, enormous advantages as to cost of production are claimed on behalf of the new process of manufacture.

Mr. Billings has offered the process and other rights to the Returned Soldiers' League for development solely in the interests of the returned soldiers. Should the inventor's claims justify themselves under rigid investigation and exhaustive trial, and should it be able to persuade the Minister to give his support, an industry could be inaugurated which would be capable of great expansion and would largely help to solve the unemployed soldier problem.

The raw material, the bark of many species of eucalyptus, can be obtained very cheaply in inexhaustible quantities for the cost of stripping and freight, the tree trunks being available for sawn timber, posts and rails, palings, or firewood. Hundreds of tons of bark now discarded as useless at the bush sawmills may be made to produce a greater sterling value in fibre than the entire timber products of the mills. Surely this is an industrial and economic romance—one of those victories for which peace is justly renowned.

In the factory the bark is passed first through a "softening" machine, which loosens out the fibres, it then goes on to a carding machine, when the disintegrated fibre is conveyed to a spinning machine to be spun into yarn. Mr. Billings had to invent and manufacture his own machinery for carrying out his process, but he is now able to demonstrate on a commercial scale the capabilities of his propositions.

Nothing of the bark is wasted, and Mr. Billings declares that 100 lb. of bark produces 100 lb. of marketable products. He guarantees to be able to prove amazing financial results, but he sits down hard on the dictum that the soldiers are to have the first chance to the industry. He says they have earned that right.

Poultry.

REPORT OF EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JULY, 1919.

The laying for the month has been very satisfactory. Nearly every pen responded to the improved weather conditions. Broodies have given very little trouble in the single pens, the majority coming from the heavy group section. The health of the birds has been good, only one death having occurred, which took place on the last day of the month. The winners of the winter test cannot be given until the weights of the eggs have been taken; this will be done during the early part of August. The highest single scores for the month were as follows:—F. W. Leney's Black Orpingtons, 29; J. M. Manson's White Leghorns, 27; J. Ferguson's Chinese Langshans, 26; H. Puff's Rhode Island Reds, 26. The following are the individual records:—

Competitors.	Breed.	June.	Total.
LIGHT BREEDS.			
*J. M. Manson	White Leghorns	145	488
*W. Hindes	Do.	131	481
*Dixie Egg Plant	Do.	133	466
*T. Fanning	Do.	142	452
*E. A. Smith	Do.	131	428
*Dr. E. C. Jennings	Do.	128	417
*Haden Poultry Farm	Do.	123	415
*G. W. Hindes	Do.	125	412
S. McPherson	Do.	129	402
*Range Poultry Farm	Do.	121	398
G. J. Byrnes	Do.	125	381
*C. P. Buchanan	Do.	114	372
*Quinn's Post Poultry Farm	Do.	115	369
G. Williams	Do.	109	368
J. H. Jones (Toowoomba)	Do.	123	367
*B. Caswell	Do.	107	358
*H. Fraser	Do.	118	358
*W. Becker	Do.	109	349
S. W. Rooney	Do.	121	348
H. A. Jones (Orallo)	Do.	107	341
W. A. Wilson	Do.	122	337
*W. Lyell	Do.	105	336
*L. G. Innes	Do.	120	320
*Mrs. L. F. Anderson	Do.	131	319

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	June.	Total.
LIGHT BREEDS—*continued.*			
*J. J. Davies	White Leghorns ...	126	317
*Mrs. R. Hunter	Do.	1 5	316
G. H Kettle	Do.	113	295
Geo. Trapp	Do.	94	292
*Mrs. A. G. Kurth	Do.	120	286
Oakleigh Poultry Farm	Do.	1 5	279
*Thos. Taylor	Do.	103	278
Mrs. N. Charteris...	Do.	93	269
B. Chester	Do.	104	267
H. O. Jones (Blackstone)	Do.	111	266
C. A. Goss	Do.	102	259
R. C. J. Turner	Do.	86	255
*O. W. J Whitman	Do.	93	238
J. H. Dunbar	Anconas	107	230
W. Morrissey	White Leghorns ...	91	224
J. W. Newton	Do.	110	215
N. A. Singer	Do.	110	214
HEAVY BREEDS.			
*E. Holmes	Black Orpingtons ...	153	544
*E. M. Larsen	Do.	131	481
*R. Burns	Do.	152	469
Geo. Nutt	Do.	124	468
*E. F. Dennis	Do.	150	463
*A. E. Walters	Do.	128	452
*Kelvin Poultry Farm	Plymouth Rocks ...	144	429
*A. Shanks	Black Orpingtons ...	133	428
*W. Smith	Do.	118	424
*E. Morris	Do.	130	416
*D. Fulton	Do.	115	408
*Nobby Poultry Farm	Do.	127	404
*Jas. Ferguson	Chinese Langshans ...	124	377
*H. Puff	Rhode Island Reds ...	127	362
*W. H. Reilly	Chinese Langshans ...	126	356
*T. Hindley	Black Orpingtons ...	118	338
A. Homan	Do.	131	313
Burleigh Pens	Do.	97	312
*Mars Poultry Farm	Do.	120	288
*T. B. Barber	Do.	103	279
C. H. Singer	Do.	102	268
*F. W. Leney	Do.	134	266
J. A. Cornwell	Do.	131	243
R. B. Sparrow	Do.	101	237
A. Gaydon	Do.	1 7	202
H. Ashworth	Do.	93	183
Total	...	7,916	23,192

* Indicates that the pen is engaged in single hen test.

RESULTS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
J. M. Manson	79	77	84	83	81	84	488
W. Hindes	92	85	79	66	79	80	481
Dixie Egg Plant	79	69	87	91	68	72	466
T. Fanning	86	58	78	81	72	77	452
E. A. Smith	66	67	85	70	59	81	428
Dr. E. C. Jennings	74	49	74	70	67	83	417
Haden Poultry Farm	79	79	75	67	53	62	415
G. W. Hindes	79	52	82	71	62	66	412
Range Poultry Farm	45	68	80	85	50	70	398
C. P. Buchanan	46	78	62	55	62	69	372
Quinn's Post Poultry Farm ...	51	69	79	71	54	45	369
B. Caswell	49	12	63	83	87	64	358
H. Fraser	38	63	78	61	50	68	358
W. Becker	88	68	79	44	12	58	349
W. Lyell	40	73	72	57	47	47	336
L. G. Innes	29	70	36	63	66	56	320
Mrs. L. Anderson	61	73	37	41	46	61	319
J. J. Davies	41	40	60	63	66	47	317
Mrs. R. Hunter	47	62	60	58	49	40	316
Mrs. A. G. Kurth	69	52	61	47	17	40	286
Thos. Taylor	65	27	24	68	66	28	278
O. W. J. Whitman	29	62	36	31	42	38	238
HEAVY BREEDS.							
E. Holmes	96	99	101	83	102	63	544
E. M. Larsen	84	93	71	88	91	74	481
R. Burns	79	77	80	102	60	71	469
E. F. Dennis	92	53	91	80	52	95	463
A. E. Walters	76	77	90	71	55	83	452
Kelvin Poultry Farm	98	58	60	61	81	71	429
A. Shanks	35	45	93	88	75	92	428
W. Smith	42	90	67	62	94	69	424
E. Morris	76	71	70	70	89	40	416
D. Fulton	73	73	76	55	75	56	408
Nobby Poultry Farm	57	58	55	79	79	76	404
Jas. Ferguson	72	82	57	48	53	65	377
H. Puff	77	30	67	79	58	51	362
W. H. Reilly	53	47	68	74	54	60	356
T. Hindley	85	70	21	63	52	47	338
Mars Poultry Farm	32	77	77	17	15	70	288
T. B. Barber	36	57	48	56	56	26	279
F. W. Leney	33	53	63	79	12	26	266

IMPORTANCE OF CLEAN WATER FOR FOWLS.

It frequently happens that fowls which have not access to permanent water are neglected, in that fresh water is not supplied to them daily at least twice. Another neglected duty is the regular cleaning of the drinking vessels, in the water of which may be seen a shiny film of greasy matter. The proper thing to do is to scald the drinking troughs or tins. If this be not done regularly, disease is pretty certain to attack the birds.

THE BLACK ORPINGTON FOWL.

THE EVIL WORK OF THE FANCIER.

Probably no breed of domesticated poultry has been injured by the fancy craze to the same extent as the Black Orpington. Before the fanciers did their best to destroy the utility value of this breed it is doubtful if there was any better general purpose breed extant. Breeders of the fancy type of Orpington declare that the utility breeders at the present time, in aiming at a more active, more tightly feathered, and generally a more attractive bird, are getting away from the Orpington type, and are developing a mongrel specimen of the breed. As a matter of fact, utility breeders in aiming at their ideal are merely endeavouring to reconstitute the type that Cook, the originator of the Orpington, evolved. To prove the truth of our contention, we publish herewith pictures of the Black Orpington taken from the eighth edition of the "Practical Breeder and Feeder," by William Cook. In referring to the illustration of the cock bird, Mr. Cook says: "The illustration of this variety will give my readers a good idea of what the breed is, as it is a true representation of one of my best specimens." It is cheering to go back and read this old work of Cook's on his favourite breed. He says: "The plumage is very glossy in both sexes, but more particularly in the cock. The sheen should be much the same colour as that of a good Langshan. Single comb, evenly serrated in both sexes, standing erect in the cock, not large, but neat; very deep and long in the breast; red face; black legs, not too long; white toe nails, four toes on each foot, well spread out from each other. The hen's comb may fall a little to one side if it is evenly serrated and without folds in it. The large comb in some breeds denotes good laying quality. It also means that the best laying fowls have to be sacrificed because their combs are large, and the judge passes them over. This in a great measure destroys the utility of poultry, which should be *vice versa*. Poultry clubs and societies should award prizes to those which are capable of laying the largest number of eggs in twelve months. *If judges would but study the laying qualities and shape of the fowls, and not spend all their time on judging plumage, it would be more beneficial to poultrykeepers at large.* [The italics are ours—Ed. 'New Zealand Farmer.'] The proper feathers would soon follow if the other matters were attended to as they should be. In three years our poultry would be much improved, both in laying and table qualities. The birds would be a better shape, and in many cases their plumage would be better." These are words of wisdom, indeed, from the originator of our great dual-purpose breed. Would that we had more men like him dominating poultry affairs at the present time. One thing is very evident. Cook evolved the Orpington as a great utility fowl, and the men who have made a caricature of it—a glorified feather-duster—have done a wicked work in degrading one of the most valuable domesticated animals that has been created by the skill and intelligence of a master breeder. Could Cook see to-day what the best breeders of the Black Orpington—such a man, for instance, as the chief poultry expert—are producing as a standard type of the utility Black Orpington, he would doubtless congratulate them on recreating from the libel fanciers have made of his original type a bird approaching his own ideal of what the breed should be. That Cook's ideals should be those of the best men in the utility poultry world at the present day is a most encouraging fact. It is admitted that the craze for egg records has led to some strains of the Black Orpington departing from breed type, but the danger is recognised, and the best of our breeders of utility Black Orpingtons are doing all in their power to correct this degeneration. When we have capable judges at all our leading poultry shows the question of maintaining type will easily be settled.

WRIGHT'S REMARKS ON THE BREED.

From "Wright's Book of Poultry," Revised Edition. Published 1912.

With the fowls known by this name we enter upon a large class of modern breeds, produced by crossing from one or more of the original Asiatic races, including in every case some proportion of the Shanghae element. Most of them originated in America; but all those treated of in this chapter were produced in England, and some had quite different origins.

Writing in 1911, Mr. W. Richardson, of Horsham, Sussex, founder of the Buff Orpington Club and president of both the Black and the White Orpington Clubs, to whom we are indebted for notes on the black, buff, and white varieties, says—

"There is no breed of modern production in which so much interest is taken or over which there has been so much controversy as the Orpington. A good many fanciers of the older breeds raised at first all sorts of objections to them, but the opposition to their introduction only seemed to make their admirers more keen to develop the breed, with result that there are now probably more fanciers and breeders of Orpington fowls than of any other breed of poultry.

PLATE 10.—IDEAL TYPES OF THE BLACK ORPINGTON PICTURED WITH THE STRONG APPROVAL OF THE ORIGINATOR OF THE BREED, WILLIAM COOK, IN A WORK PUBLISHED BY COOK THIRTY YEARS AGO

"There are seven varieties of Orpingtons, and I will name them in the order of introduction to the public: Black, buff, white, jubilee, spangled, cuckoo, and blue. There are also rose-comb specimens of the black, buff, and white varieties. The first two are hardly ever seen now, but there are a few fanciers who breed the rose-comb white Orpington, which seems to be largely developed from the White Wyandotte, as the original single comb White Orpingtons never produced any rose-comb specimens."

The one to be first described, and the original Orpington, is so largely a Langshan that we should have included it in the previous chapter if it had stood alone. It was originated and pushed by the late Mr. W. Cook, then living at Orpington, in Kent,

PLATE 11.—THE IDEAL BLACK ORPINGTON PICTURED BY THE "FEATHERED WORLD," OF LONDON, IN ITS ISSUE OF OCTOBER 13, 1893, THE BIRD BEING OWNED BY W. PICKWORTH.

from which Kentish town he took the name. He stated that the method of production employed in regard to the singled-combed Orpington was to cross a large Minorca cock with black spots from Plymouth Rocks; pullets of this cross being then mated with clean-legged Langshan cockerels, and the produce carefully bred to a deep-bodied and short-legged type. The result was a black fowl with the green gloss of the Langshan, but with clean legs, of the plumper make of the original Langshan, with white skin and meat and a well-shaped carcase, and which is an excellent winter layer of brown eggs. The weakest point of the Orpington is that the eggs are not so large as might be expected from the size of the fowl; still they are, in single-combed strains, of a fair average size. Mr. Cook also produced a rose-combed Orpington from

PLATE 12.—THE IDEAL BLACK ORPINGTON AS PICTURED BY LUDLOW IN LEWIS WRIGHT'S GREAT WORK.

the rose-combed Langshans mentioned in the preceding chapter which had the same general qualities, but with the curious difference, which we are unable to explain, unless from some individuality of the rose-combed Langshans employed, that the eggs are smaller than from the single-combed. Owing probably to this difference, the rose-combed Black Orpington has never become generally popular.

There is no doubt that some original Black Orpingtons were produced as stated; but there is as little doubt that the breed has since considerably changed in two distinct directions. As stated in our next chapter, there is little question that one of the components of the Plymouth Rock was the Black Java fowl; and, as stated in the preceding, it is equally obvious that this Black Java has much in common with the Langshan, however that fact be interpreted. This darker and more typical component in the Asiatic blood was thus a double prepotency, and its predominance over the more Shanghae components would be intensified by breeding for clean instead of feathered shanks. This doubly strong element therefore rapidly overpowered the Minorca element, and the Orpingtons quickly became to all intents and purposes clean-legged Langshans, taking the place of that shorter-legged, symmetrical type once popular, but subsequently discarded by personal feeling of Langshan breeders. In addition to this tendency, in the early days of the breed it is known that clean-legged pure Langshans, from perfectly orthodox sources, were sold to Orpington exhibitors, and appeared immediately in exhibition pens, as well as being used for breeding with their stock. This still further strengthened and hastened the reversion to Langshan type, which was then so pronounced that at many shows only one class for Langshans or Orpington (or the converse) was provided for the two breeds. The index of this change has lain chiefly in the size of the eggs, which has somewhat lessened since the Minorca element lost power; and in the colour of the eyes, which was often red while any foreign element remained, but has now almost everywhere reverted to the Langshan brown or black.

There has been, however, quite another change, a Black Orpington of practically new blood coming upon the scene in 1891, when the late Mr. Joseph Partington exhibited at the dairy show in October two cockerels and two pullets, which secured first and second prizes in each class, three of the four birds being immediately sold at £30 each; notwithstanding which, at the Palace Show a few weeks later, he brought out fresh birds of each sex that beat these previous winners. These birds were of a size that had never before been seen, creating quite a sensation and considerable curiosity. Mr. Partington assures us that these Orpingtons also were cross-made birds, but had none whatever of Mr. Cook's original strain in them at all, and that he had deliberately started with the idea of breeding himself something in the same line, but more striking and handsome. They were very large, and of splendid colour, with massive shape, and all had dark eyes. These points made them invincible in the show pen, and from this new strain, combined with the original, are descended the bulk of the winners of the present day. Many of the new strain displayed so much more fluff than former Black Orpingtons that we cannot help thinking large females of either Black, White, or perhaps even Buff Cochin may have been employed with Langshan males.

Writing on the Black Orpington, Mr. W. Richardson says: "The first variety of the Orpington fowl to appear was the black single-comb and rose-comb. The birds were identical but for their combs, and the single comb variety was always much more popular.

"The Black Orpington is our handsomest black fowl, and to see the classes at the classical shows is a treat to a lover of black poultry. They are, as a rule, good layers of a nice brown egg, and, except for their black legs, a first-class table bird.

"The colour of the cock should be black, with a rich bottle-green sheen on all his feathers, free from bronze purple, purple barring or red or white in neck or saddle hackles. He should be massive, short, broad, and deep in body, showing a wide U-shaped curve on the back and underneath, and stand on short, straight legs, black in young birds and dark slate colour in old ones. There should be no red or yellow in feet or legs, and his toes should be well spread out and straight with white toe-nails. The comb, wattles, and ear-lobes should be medium in size and of a fine deep coral red, the comb should be straight, evenly serrated, and set firmly on his head. His eye should be dark-brown or almost black, the darker the better, and his beak should also be black or very dark horn colour. His plumage should be silky in texture and very abundant, and his tail and hackles should be flowing, but his tail should not be long nor the feathers too stiff.

"The hen's colour should be the same as that of the cock. She should look as massive as possible, her tail should be short, and she should have a nice wide rising cushion like the Brahma, rising gradually to the true tail feathers, as distinguished from the round ball cushion of the Cochin, which is very objectionable. The curve of her body should come straight down from her head round the breast, and passing under and up to her tail in a perfect wide U shape, the same as the curve on her back from head to tail.

PLATE 13.—HOW A GREAT UTILITY BUT MOST HANDSOME BREED HAS BEEN DEGRADED BY THE FANCIER IN HIS CRAZE FOR MAKING FANCY FEATHERS THE CHIEF PRODUCT OF A FOWL.

This is the popular "fancy" Black Orpington of the present day which fanciers have persuaded many people into thinking is the true type of the breed instead of the caricature they have created.

"Some birds show a keel which is not required, and it rather spoils their outline and appearance. The weight of the cocks should be from 9 lb. to 11 lb., and that of the hens 7 lb. to 10 lb. Equally good cockerels and pullets can be bred from the same pen, which saves double mating, though some strains seem to produce better cockerels and others better pullets."

Colour should be bred for as in the Langshans, but the crimson between the toes is not required. Particular attention should be given to preserving the correct shape, with a broad and deep breast, the whole body looking massive and solid, and set rather low. Excessive fluff should be avoided, as tending to decrease laying, and being often accompanied by thicker skin; too small combs, also, are apt to be signs of diminished egg production. We have seen one or two specimens distinctly keeled, almost like some exhibition ducks, and this ought certainly to be deprecated. It is probably due to carelessness of these points that statements have lately appeared to the effect that some strains of the Black Orpington have not kept up its reputation as a good layer. Both abundance and size of eggs would, however, quickly respond to selection for these qualities, in the manner insisted upon in former chapters of this work.

Judging Utility Orpingtons.

The Poultry Show Society that can get a Government instructor to judge its birds is lucky. On the one hand, the ordinary fancier breeder has, in the majority of cases, an absolutely wrong conception of what utility men are aiming at, while there are few utility breeders in the country capable of judging according to breed character. For several seasons back we had an opportunity of witnessing the work of a leading poultry judge in utility classes. It was farcical. The feather type of Black Orpington won every time, while the leggier the light bird the better it was in his estimation. But this judge is mending his ways. We recently witnessed his work in a utility section again. He has altered his views. But he has gone to the other extreme. Instead of attaching main importance to type, he is judging on alleged indications of laying quality. Conformation, character, and expression are accounted apparently of little value, but the texture of the skin in the abdominal region and the length of breastbone are evidently the main deciding factors. He passed over one bird because the texture of the skin in the abdominal region was not fine enough, in favour of an absolutely coarse type which any amateur could tell had not the laying temperament. Fancy judges should be made to see once for all that birds in a utility competition are not supposed to be judged on alleged indications of laying power—the trap nest or single pen will decide the laying quality—but that superiority is to be determined more by correctness to type of the breed represented, the main difference between the utility and the fancy birds being that one is a natural specimen and the other is an exaggerated one. Of course, we do not expect the fancy judge to take our meaning from this last statement. He will naturally contend that his type is not an exaggerated type. But if he will study Ludlow's plates or pictures of any of the leading breeds before the extreme fancier got to work on them he may be persuaded to view the matter from the right standpoint.

Communications.

Some time ago a communication was received from a progressive poultry-keeper in some part of the Dominion telling of his method of inbreeding, but though we can make a good guess at the signature, the writing of his address is still puzzling us. It is a common mistake of people to be a little careless in signing their names and writing their addresses. Because it is plain to them they think it is plain to others. Our correspondent, whom we would like to hear from again, concludes his letter with this statement: "I find if you make a new brooder, costing about 1s., for every fifty chicks, the death-rate is very low." We would like to have had some particulars of this interesting experiment, and just how this cheap and effective brooder is constructed.

Storing the Summer Surplus.

Referring to the work of the late Poultry Conference, the Chief Poultry Expert, Mr. F. C. Brown, thus speaks of the matter of cool storage for the summer surplus of eggs:—"It was even more satisfactory to learn from an Auckland delegate that his circle had in cool store no less than 50 tons of pulped eggs for use during the scarce season, besides large quantities of eggs in shell. This is how it should be. Any surplus should be preserved on the circle's own account rather than allow others to do it, and reap the reward as a consequence. No doubt other circles will follow the excellent principles adopted by the Auckland circle. Once this becomes more general it will go a long way towards bringing about a more uniform price for eggs throughout the year." It is especially satisfactory to have Mr. Brown's commendation of this principle. Shortly after the Auckland Egg Circle was formed the editor of the "Farmer" made a personal appeal to the secretary of the Auckland Farmers'

PLATE 14.—BLACK ORPINGTON HEADS AS PICTURED IN COOK'S WORK.

THE HEAD OF THE GOOD LAYER.

THE HEAD OF THE BAD LAYER.

Freezing Company, Mr. Long, for his powerful organisation to come to the aid of a small struggling community of primary producers, to cool store their summer surplus so that they might get the full value for their eggs in the winter months instead of being exploited by the city grocers. The principle appealed to Mr. Long, seeing his company was purely co-operative, and he arranged an interview between his chairman of directors, Mr. Ambury. Mr. Ambury received the proposal very sympathetically, but said, of course, that all the eggs would have to be tested to insure that the company would have the needed security against the advance. The engineer was consulted, and after going into the matter of modern methods of testing eggs, &c., Mr. Ambury agreed to the very liberal advance of 11d. a dozen. The writer then informed the secretary of the Auckland Egg Circle of what he had done. The secretary saw the company and made all the arrangements, and for the past two seasons the arrangement has run most smoothly, bringing great profit to the members of the circle and placing the society on a firm footing. The Auckland Egg Circle graciously acknowledged our assistance in the following resolution:—"That the 'New Zealand Farmer' be thanked for using its influence in making satisfactory arrangements with the Auckland Farmers' Freezing Company, Limited, so that this society was able to cool store its surplus eggs."

LENGTH OF COMB.

It is interesting, in view of the statements of those great foundation breeders, Cook and Wright, that length of comb in the Orpington goes with laying quality, to have the opinion of a notable Australian breeder, J. E. Bradley, on this subject. Mr. Bradley has noted in the best-laying strains of Black Orpingtons there is a period in the history of the strain when the combs tend to oversize. This can be corrected, but the comb of the laying strain is always, on the average, larger than the comb of the show-type Orpington. Observant breeders have noted that in the majority of cases the good layers had larger combs relatively than had the poor layers. Combs are secondary sex characters; they are correlated with other primary sex organs. The comb of the hen increases in size when she is about to lay, or is laying. The growth, size, brilliant colour, &c., are due to increased nutrition, through the blood supply to those parts. In the blood supply there are phosphorus compounds, and doubtless substances contributed by the organs of internal secretion, the presence of which influences the condition of the comb. The various substances become oxidised in the comb (wattles), and are then, of course, lost to the system. In the case of the dubbed bird, the circulating blood still carries the substances referred to, but they are conserved to a great extent, and serve as nutriment for the primary organs and their related parts. Dubbing is an operation which, if properly performed, causes very little pain, but certainly insures the bird against the very great pain of a comb lacerated through accident.—"New Zealand Farmers' Stock and Station Journal."

THE MUSCOVY DUCK.

By R. T. G. CAREY, Beerwah.

FROM WEANING TO MATURITY.

Duck culture has many side issues that require diligent attention; foremost is "weaning"—whether you take away the mother, or discontinue the brooder. Either will often exercise some serious effect upon the tender constitution of the ducklings, whereas the removal (oftentimes too early) of either the natural or the artificial warmth (suddenly discontinued because of climatic conditions during the night) indicate a favourable rise in temperature and occasion the belief that the period has arrived to transfer that brood into cooler quarters. But, unawares, a cold snap occurs, and the sudden chill causes a loss, not only through death, but affecting health thereafter, inasmuch as the labour entailed in rearing or raising them up to that age means a serious loss.

The prudent duckman does not take such chances after having, by careful attention, reared his ducklings to that stage when they will not need the brooder, but has the all important substitution previously prepared and ready which may be a comfortable well-sheltered house, with a deeply-grassed floor, not stuffy, but well ventilated. In such a fireless brooder young ducklings may safely be reared. The foregoing remarks are in reference to our early-hatched ducklings throughout the wintry months.

During the settled warm weather (meaning summer), the risk in weaning ducklings is less; doubtless it can safely be done, almost as early as the young are dried off, because they can depend entirely upon the warmth of their own bodies and that of their mates with beneficial results. Therefore, brooders, at such times of the seasons, are not necessarily needed. The fact is that the open pens and pure air dispel the close and foul air that would have occurred if a brooder were used.

My own experience is that a broody duck can foster 50 to 60 youngsters. What really is needed, and the most requisite, is a "philo-attendant" to keep them from wandering, as a delinquent youngster may leave the flock and get lost, or probably be seized by some reptile or hawk. The *wanderer*, as soon as he feels that he is astray, stands erect to the fullness of his height, and begins to peep! peep!! peep!!! Listen for the call—the "squaw." Although often at a great distance from his mates he instinctively makes a bee-line-run back to his brethren. It is a wondrous sight to see the dear little fellow run—Oh! how he can go!

Culling at the weaning stage must be effectively done. The very poor and unpromising ones, or those with tears in their eyes, should be killed at once; this minimises the loss and the useless expenditure of feed and labour in trying to rear and nurse them until they reach a marketable size. Even then they are miserable ducks, which fail to realise a value that does not pay for the cost of labour, &c. Unless a duckling, at this period, is vivacious, promising, and not lacking in "pep," but has some slight physical ailment or enervation arising from hereditary atavism, its immediate slaughter may be deferred, but it ought to be legbanded, so that when grown it can instantly be identified as unfit for a breeder, but suitable for the table.

Breeders, which are invariably chosen at this period or at some other subsequent date, are separated and treated by judicious feeding up to maturity, but on no account must force feeding be done. Breeders, wherever possible, should be range-fed, as the exercise maintains constitutional vigour and health and prevents the young breeders from gaining or running into fat, or becoming lazy or mopish. The objective for a good breeder is to induce a strong frame of bony structure, which afterwards can be meat-filled, and just as soon as it attains full development may be mated up. Naturally of high fecundity, breeders seldom have infertile eggs. The probability of the number of hatches that a Muscovy duck may raise during any one year could be given with some accuracy, but is dependent on good or bad management. However, that may be; by a very careful adherence to details and good administration, she can raise 50 or 60 ducklings in a season.

Constructively the Muscovy ducks are not heavy egg producers; therefore they are not bred for egg production, but rather for meat purposes. It is the raising and rearing of the young stock and the correct feeding, also the marketable age, that the raiser must fully study. There are times when market prices are fabulous, whilst there are other times when the figures are ridiculously low. In a season, or at times of the year when full-grown ducks are in demand, also when a young juicy duckling of half the weight of a full-grown one is wanted, it never pays to market the birds when only partly fatted or poor-conditioned. Always aim at getting the greatest weight that can be attained. Say in a flock of twenty-five, the pen average weight per bird must correspond with age. Watch carefully when the condition is just accomplished or on the point of acquiring its fulness, then market immediately. The buyer will snap the opportunity of purchasing the prime article, and the business pays well when the seller, purchaser, and producer are all satisfied.

CAMPINES.

Little, if anything, is to-day heard of the breed of poultry known as Campines, yet, only a few years ago, this breed was all the rage in England, when it was a very old-established breed in Belgium. At that time a special correspondent of the "Adelaide Observer" wrote as follows concerning this breed:—

Campines.—Mr. E. Cobb, F.Z.S., says:—"Whether the Campine is bred from the pencilled Hamburgh or the Hamburgh from the Campine is a point as yet unsettled, but I am strongly of opinion that the Hamburgh derives its origin from the Campine. I could quote several reasons in support of this argument, but will content myself with two or three. Firstly, the silver Campine never throws a rose comb, but every breeder of silver pencilled Hamburghs knows that he gets many single-combed Hamburghs. Secondly, the silver Campine is a much larger bird than the silver pencilled Hamburgh (quite a few hens weighing 6 lb. and over each), and this can easily be accounted for by the amount of in-breeding that has been going on for many years in order to perfect the grand pencilling of a present-day show specimen of the pencilled Hamburgh. Thirdly, the silver Campine has a dark, nearly black eye, and the silver pencilled Hamburgh a red eye. At first sight there may not appear anything in this to uphold the argument that the silver Campine is the parent of the silver pencilled Hamburgh, but I think I can show that there is, and a strong one too. Among the silver Campines there are some that have more or less a light eye, and I am perfectly certain that, in a very short while, it would be most easy to produce red-eyed Campines by simply selecting those that show a tendency to deviate from the dark eye. Old Hamburgh breeders probably thought—as they

would now—that the colour of the eye was a secondary consideration compared to the pencilling, and, therefore, mating solely for pencilling, they probably bred from many light-eyed specimens, and inbred such, and, in consequence, eventually produced the red eye; or it might even be that they endeavoured to produce the red eye. But in any case the red eye could easily be produced from the Campine, though, in my opinion, it would be almost an impossibility to establish the black eye from the silver pencilled Hamburgh."

The silver Campine is kept in Holland almost exclusively for its grand laying qualities and for the rapidity of its growth, enabling the farmers to sell "spring chickens" at a much earlier date than most other breeds. The majority of what few fanciers there are in Belgium appear to scour the farmyards in the country a short time previous to a show, and to pick up the best specimens, the consequence being that there has been no serious attempt to scientifically breed the Campine to standard, and, although it was necessary to go to Belgium for the original stock, it is becoming more apparent every day, especially as the adopted English standard differs considerably from the Belgian, that it will be useless to do so in the future.

In Belgium the Campine is called by two names—viz., Campine and Braekel—but to all intents and purposes they are one and the same breed, and English fanciers designate them under the same heading, Campines. The fact is there are two well-known districts in which the breed has for many years been produced. In one, owing probably to mismanagement, though they put it down to the soil, they are bred far smaller than in the other, but the standard is the same, and I think the whole matter speaks for itself when I quote the words of a well-known Belgium breeder, who informed me that—"We don't know when they are chickens whether they will be Braekels or Campines; it all depends on whether they grow big or remain little." To any impartial critic there can be no question as to the utility powers of a Campine as a layer. Given a good strain, they lay what may be fairly called a large market size egg, and an abundance of them both winter and summer. They are very hardy, small eaters, and if given their liberty will find more than half the food they require. They are non-sitters (there are always a few exceptions to every non-sitting breed), and, like all non-sitters, lay a white-shelled egg, but I have always found that two white-shelled eggs fetch more than one brown one.

As an exhibition fowl they are most pretty, and have taken a strong hold on the British fancier. All the principal shows and many others in England are now giving classes for Campines, which are always well filled, and there is no doubt that silver Campines are one of the most profitable breeds in which to invest, not only for their laying qualities, but as one of the coming most popular exhibition varieties. It is to be noted that there are three varieties of Campines—viz., silvers, golds, and whites; but the silvers are the only ones that are finding genuine favour in England. The following is a copy of the revised standard as issued by the English Campine Club:—

THE CAMPINE STANDARD.

General Characteristics.

Beak—Short.
Eyes—Bright and prominent.
Comb—Single, medium, with even serrations, coming well back, free from excrescences, upright in cocks, falling over in hens.
Face—Smooth.
Earlobes—Medium, inclined to almond shape, free from wrinkles.
Wattles—Longish, fine in texture, in proportion to comb.
Neck—Medium length, nicely arched, well furnished with hackle.
Breast—Very full, round, carried well forward.
Back—Rather long.
Body—Broad, tapering to tail, close and compact.
Wings—Large, neatly tucked up.
Tail—A good length, sickles and secondaries broad and plentiful, carried well out from the body.
Legs and feet—Medium length, toes slender and well spread.
Size—The larger the better.
Carriage—Very alert and graceful.

Colour (Silver Cocks and Hens).

Beak—Horn.
Eye—Iris dark brown, pupil black.
Comb, face, and wattles—Bright red.
Earlobes—White.
Legs and feet—Leaden blue; toenails horn.
Neckhackle—Pure white.
Body, wings, and tail—Rich, beetle-green, mackerel markings or pencillings evenly distributed on a white ground, forming as near as possible "rings" around the body.

It is to be noted there are no specimens in existence conforming to this standard in every respect; but these particulars represent an "ideal" bird for breeders to strive to produce.

Scale of Points (for guidance of Judges).

Comb	5
Eye	5
Earlobe	5
Legs	5
Hackle	10
Condition	10
Beetle-green sheen	15
Tail	15
Distinction and evenness of markings	30
	100

Disqualifications.

Legs other than leaden-hue.
White in face.
Red eyes.
These markings to be broad and not fine like a Hamburgh's pencillings.

Standard for gold Campines the same as silver, merely substituting the word "gold" in "white" as above. The gold ground colour to be as rich as possible and not a washed-out yellow.

Apiculture.

THE AUTUMN AND WINTER MANAGEMENT OF BEES.

Mr. W. A. Goodacre, Senior Apiary Inspector, New South Wales, writes on the above subject, in the "New South Wales Agricultural Gazette" (2nd April) as follows:—

Greater attention should be given by the majority of apiarists in preparing their colonies for the hardships of winter, and to enable them to come into spring with a minimum of loss and a maximum of population. Many apiarists state that they have had practically no loss, in spite of the lack of preparation; but it is found in the majority of such cases that a loss has occurred in the population of the colony. Bees require less attention than most things on the farm, but what is required must be given. The practical man will prepare his colonies for winter during summer and autumn; for in this industry it is necessary to prepare for the future, and thereby save many colonies that would otherwise perish through lack of foresight and consideration on the part of the owner.

AUTUMN MANAGEMENT.

In the autumn the colonies should be prepared for winter, and first of all it will be necessary to have a considerable number of young bees capable of the prolonged work of heat generation and for the purpose of starting extensive brood-raising in the spring. To obtain the young bees we naturally look to the queen, and favourable brood combs in the brood nest. This is the time to replace any failing queen bee, also any queen completing her third season. A failing or unsatisfactory queen can be distinguished by notice and comparison in the brood nest; for instance, a sprinkling of drone larvæ will often be found in the worker cells (the top of these cells when capped will be bulged to the shape of a .22 rifle bullet); the queen in this case will have a worn-out appearance. In other cases the brood will not be packed, as will be noticed where a vigorous queen is present. The progress of the colony should be noted for some time, and the failing or old queens should not be allowed to remain long enough to decrease the population.

At all times care should be taken to have selected combs in the brood nests. If combs containing many drone cells are noticed during the autumn they should be removed to the outer edge of the brood nest, and when an opportunity arises, such as a honey-flow combined with favourable weather, such combs can be removed and used for honey storage only; they should be replaced with full sheets of comb foundation in the brood nest.

During extracting in the autumn many combs containing emerging brood will be noticed in the supers of populous colonies; many of these can be used to strengthen the weaker colonies. Use judgment in this and do not retard the progress of the populous colonies to any extent; it should only be a matter of taking one frame containing a fair patch of emerging brood from each colony. There are apiarists who try to assist weak colonies by giving unsealed brood; this is a great mistake, as the colony generally has as much as can be cared for, and this extra strain placed on them will result in a good deal of neglected and chilled brood.

Care must be taken to have ample stores available for winter months; generally one full super and what is naturally contained in the brood nest will be sufficient and will give a good start for extensive brood-raising in the spring. If ample stores are not left in the hive, it will induce the bees to become economical and come into spring with less vigour.

All surplus supers should be taken off, and the colony left with as much space as can accommodate the bees comfortably; when a colony is left with too much space and the hive not adjusted to prevent a draught, the bees eat more than should be necessary in order to keep up the temperature; this will often cause dysentery and heavy losses through "spring-dwindling" later.

Coming on winter many apiarists contract the entrances to the extent of only allowing a few bees to pass out at one time; this is a mistake, and may result in having mouldy combs in the spring. Bees need a certain amount of fresh air; a ⅜-inch entrance, full width, will not be too much for the average colony. All other openings should be plugged, so as to prevent a draught through the cluster of bees.

Insulating material, such as ruberoid and good sheets of paper placed over the frames just before the winter, is advisable; if paper is used it should be removed early in the spring as the bees will tear it to pieces. The cover should be sound, and an extra covering of good sound bark is advisable; this bark when properly stripped and cleaned does not spoil the appearance of the apiary by any means. Colonies of less than four good frames of bees should be united; this can be done by placing a sound sheet of newspaper between them. This will prevent the bees immediately attacking each other, and by the time they nip their way through the paper, and unite gradually, they become reconciled. It is best to unite colonies after the bees have finished the day's work.

Colonies which cover four or five frames can often be wintered successfully by placing a follower or division board and pack paper in the space between the follower and the wall of the hive, having a good sheet of brown paper over the frames; such a colony should have ample stores. Colonies found to have insufficient stores for winter can be given frames of honey from other colonies, or fed with sugar and water made up as outlined later.

WINTER WORK FOR THE APIARIST.

There are localities in New South Wales where bees gather surplus sufficient to warrant the apiarist using the extractor during the winter months, but this only occurs in warm localities and is not general. In the majority of places the bees should be left severely alone until activity is resumed in the spring. There will be a considerable amount of work during winter, such as preparing hives, tins, &c. As many apiarists use benzine tins as a container this will be the time to obtain a stock; they should be washed and the tops soldered ready for use.

Great care is necessary in washing the tins. This is a good method:—Take 8 gallons of water, 1 tablespoonful of carbonate of soda, and a small piece of soap, bring to boiling point and stir well. About one quart should be poured into each tin, then give a good shake to get the solution into all corners. If no washing machine is available this can be done by hand if the hands are protected, for the tin becomes very hot. The solution can then be poured into other tins, giving double quantity. The tins should be immediately rinsed with cold water in the same manner, and then placed in the sun, the opening of tin at the lowest if possible; the tins can be dried out later, and still kept in the sun. This one treatment will suffice generally, but further treatment is at times necessary; there should be no odour of benzine in tins to be used as honey containers.

Frames can be made up and wired, but it is not advisable to place comb foundation in the winter.

THE ARTIFICIAL FEEDING OF BEES.

There are indications at present that apiarists in some localities will need to resort to artificial feeding of their bees, in order to supply the necessary winter stores; also in other cases where there may be a lack of stores. It is therefore advisable to consider the different methods of feeding, the class of food suitable for bees, and the effect according to existing conditions.

CLASS OF FEED.

This may consist of (1) honey, secured from an apiary known to be free from disease, or (2) syrup, made from good cane-sugar and water.

To make the syrup use one part of sugar to one part of water by volume; boil the water, then add the sugar a little at a time, keeping well stirred, until all the sugar is dissolved. If this class of food is to be given late in the autumn in cool climates, add two parts of sugar to one of water. Honey is not necessary in this syrup, but 1 pint to 4 gallons will be an improvement.

SERVICEABLE FEEDERS.

If the feeders are to be purchased from the factory, the "division board feeder" is recommended for supplying winter stores, and the "simplicity" for supplying stimulating feed. If expense is a consideration, use any sound container that will fit in the super or hive, and allow access by the bees; if tins are used it will be necessary to place pieces of board to prevent the bees from being drowned.

METHOD OF PLACING FEEDERS.

Place an empty super on the hive, and a mat over the frames, allowing some space at each end for the bees to pass. Another method is to remove a few frames to allow of sufficient space for the feeder; an empty super and mat will be unnecessary in this case.

THE USE OF STIMULATING FEED.

This class of feeding will induce brood raising, and should only be given under favourable conditions, such as when the weather is mild, and not likely to change for some time, and when at least a small quantity of pollen is being gathered (no nectar). It should not be given in the month of April unless in a warm climate.

Give about 1 lb. of the honey or syrup daily to the average colony; if candied honey is used, give about 2 lb. every third day. If the conditions are favourable, the apiarist will be well repaid for his trouble by having a large number of young bees ready for the hardships of winter.

FEEDING FOR WINTER STORES.

Feeding for winter stores should take place late in the autumn, when it is considered that there is no chance of a further flow of honey. The food should be given in large quantities, making a total of not less than 25 lb. in not more than three days to the average colony. In case the colony has insufficient stores, the quantity can be regulated to increase the total weight to about 25 lb.

LACK OF STORES DURING THE SEASON.

Feeding on account of lack of stores can be done in the same manner as for winter, only that a smaller quantity would be necessary; for instance, if the honey flow is expected in about six weeks, then about 10 lb. would be sufficient. It is not advisable to give more than 10 lb. at any time; the bees can be fed again if conditions warrant such a course.

RHODES GRASS FOR SHEEP.

Mr. W. G. Brown, Instructor in Sheep and Wool, Department of Agriculture and Stock, whose articles on the raising of sheep on our coastlands, published from time to time in this Journal, were largely instrumental in inducing several farmers to make trial of small flocks on their holdings on coast lands resulting in proving that by judicious feeding and management the business is a profitable one, has just reported to the Department the result of his inspection of Mr. F. W. Lee's property, at the Baking Board Siding, on the Western Line. "Mr. Lee," he writes, "has 400 acres of Rhodes grass. This area has been carved out of thick prickly-pear and brigalow scrub, and is now quite clear of pear. To provide for a bad season, such as he has experienced for the past nine months, he dug a pit and stowed away about 100 tons of Rhodes grass, which in the main part made excellent ensilage. This ensilage has stood to him remarkably well, for he has been feeding 1,600 sheep on it and the scanty growth of grass left with very little loss. Of course he has overdone the business in the matter of stocking.

"He has now about 30 tons of ensilage left, and it is instructive to see the sheep, as soon as the ensilage is being cut out of the pit, running from all directions to get it.

"I call your particular attention, sir, to this case, as showing the possibilities ahead of sheep farmers who provide fodder for a possible bad season. All this man's neighbours have had little or no stock running on their holdings for months. He has proved, incidentally, that Rhodes grass is excellent sheep feed. I may mention that the total cost of the ensilage to Mr. Lee was £35 outside of his own labour. His sheep, although poor in condition, are healthy and strong, and he has done very well in the past, when the seasons were good. His wool last year sold really well, up to 19½d. per lb. being realised. A few hundred selectors of this stamp would make a big difference in Queensland, for their example would show how remunerative the sheep business is, if only provision were made for a very probable bad season. I may say that several other selectors are following his example, and will store fodder when rain comes."

Dairying.

WHEY FOR CALF-REARING.

There is at the present time a great need for the extension of cheesemaking, which shows every prospect of being profitable, and the Board of Agriculture have endeavoured during the past year or two to demonstrate in a number of centres the possibilities of co-operative cheesemaking for farmers, and have arranged for instruction through travelling cheese schools. The chief objection of farmers in stock-raising districts to taking up cheesemaking is that they say they must have either whole milk or separated milk for their calves. The development of cheesemaking is, therefore, held up until farmers can find a substitute for their calves. The substitute is at hand—in the cheeseroom—in the shape of whey. Most farmers may be unaware how they can use it with advantage for calf-rearing. About a year ago the Board arranged for trials to be made, and it has been found that by using a mixture of concentrated and highly digestible foods the difference in composition between milk and whey can be made good. Farmers are now able to convert their milk into cheese without fearing that their calves will suffer—"Live Stock Journal."

LINSEED FOR CALVES.

The "South African Farmers' Advocate" says that in rearing young calves there is nothing to compare with the judicious use of linseed.

A GREAT FRIESIAN RECORD.

The rapid rate at which a small start of pure-bred Friesian cattle grows into money is illustrated by the herd belonging to the University of Missouri.

In 1902, the expert who had recently taken charge of the Dairy Department of the Agricultural College, was allowed £120 to start a herd of Friesians. This small sum, of course, went farther than it would now. Four pure-bred heifers were purchased. One of these, after having a bull calf, proved to be unsatisfactory, and was sold with her calf. Not a single female has been purchased since that time, and all the herd is descended from the three cows. Up to the present there has been sold surplus stock to the amount of £2,394 cash, and there are on hand forty-three females, the inventory value of which is £3,230.

In the herd descended from these cows have been developed six cows that have produced over 20,000 lb. of milk in a year, four of them having butter records above 800 lb., one of them holding the State record for butter for Missouri for several years. One has averaged over 14,000 lb. of milk a year for nine years. Another has produced over 144,000 lb. of milk so far, and is still producing over 55 lb. a day at the age of thirteen years.—Perth "Farmer."

RELEASING A MOTOR-CAR.

The "South African Farmers' Advocate" shows how a motor-car sunk in a sandbed may easily be released, and records how a motor-car sank down deeply in a sandy patch, and the lady driver could not get it out. In the country many drivers carry a small coil of wire for emergencies of this kind. A tree or fence post, or even a stout post driven down into the ground, will serve as an anchor. Fasten the wire securely to this, then run it under the protruding hub or the rear wheel, and fasten it to one of the spokes. If the gear is reversed, the car will back itself out.

Tropical Industries.

THE CULTIVATION OF SUGAR-CANE IN QUEENSLAND.

By HARRY T. EASTERBY, General Superintendent, Bureau of Sugar Experiment Stations.

PART IV.

CANE CULTIVATION ON OLD LANDS.

Having dealt with the growing of cane upon new scrub lands we may now proceed to the cultivation of cane upon older lands—viz., lands that are cleared and under the plough. By far the greater part of the cane lands in Queensland come under this category, especially in the older areas which have been growing cane for many years. In the following districts either the whole or the greater part of the canegrowing lands are under the plough:—Logan, Maryborough, Isis, Bundaberg, Mackay, Proserpine, Lower Burdekin, Herbert River, Mulgrave, and Mossman.

Commencing with old land, then, that has grown cane before, the first thing to be done is to plough out the stools of the previous crops. A disc plough, either double or single, is generally used for this purpose, and the discs should be particularly sharp so as to cut up the stools as much as possible. A few farmers make a practice of carting away the old stools, and if the time and labour can be afforded it is often wise to do this, as it gets rid of any disease and borer. It is, however, recognised that there are many difficulties in the way of carrying this out, and if it is not practicable the stools should be cut up so as to secure their quicker disintegration.

LIMING.

Owing to the long-continued growth of cane upon the same land, and also, in some instances, to the continued use of acid fertilisers such as sulphate of ammonia and superphosphate, the bulk of our older cane soils in Queensland have become acid in reaction. This has been exhibited time after time in analyses of soils made by the Agricultural Chemist and by the Sugar Bureau. After ploughing out the stools it is, therefore, wise in most instances to apply lime, and it also has the advantage of increasing the purity of the juice of the succeeding cane crops. There are many other benefits to be obtained from a dressing of lime which may be summarised as follows:—

1. It acts on dormant mineral matter and renders available phosphoric acid and potash which would otherwise remain inert.
2. Acts on organic matter and converts part into nitrogen compounds available for the crop.
3. Enables the plant to make the greatest use of artificial fertilisers.
4. With moisture and warmth it favours the maintenance of abundant bacterial life, especially those forms which aid in nitrification.

5. It develops the activity of root bacteria in leguminous crops. In soils with an acid reaction, the fixation of nitrogen from the air is frequently at a standstill.

6. Improves the mechanical condition of the soil. Stiff clay soils are rendered more friable, less adhesive, and porosity is increased, so that its cultivation can be more easily undertaken.

Lime is usually applied to the soil in the following forms:—

(*a*) Burnt lime or lime oxide.

(*b*) Air slaked lime—*i.e.* burnt lime that has been allowed to gradually slake in the air and which ultimately becomes lime carbonate.

(*c*) Water-slaked lime (lime hydrate).

(*d*) Pulverised limestone (lime carbonate).

Burnt lime is the most valuable form for sweetening soils, and producing alkalinity, especially on our Northern canefields, where the rainfall is great and the humus plentiful. It is, however, hard to obtain in a fine condition, and is very disagreeable to handle. By air-slaking, however, it soon crumbles into a fine powder which gradually turns into lime carbonate—a milder form of lime. This can be easily applied, and is recommended where a quick action is desired.

Ground or pulverised limestone is also very useful, but its action is comparatively slower.

THE RELATIVE VALUE OF DIFFERENT FORMS OF LIME.

Fifty-six pounds of fresh burnt lime contain the same amount of lime as 100 lb. of carbonate of lime (ground or pulverised limestone); 100 lb. of old air-slaked lime; 74 lb. of water-slaked lime; 100 tons of burnt lime have the equivalent value of 178½ tons of pulverised limestone or carbonate of lime.

The pulverised limestone is much more agreeable to handle than burnt lime, even when the latter is air-slaked, but in considering cost it has to be remembered that in value 1 ton of burnt lime is equal to approximately 1¾ tons of ground limestone, and will slake to that amount. In considering its purchase, therefore, the question of freight and price must be considered, so that it may be determined if it can be used economically. The very high price of lime in many of our sugar districts renders its application a costly business. This is largely due to the freights charged, and when it is considered how largely dependent the Northern steamship traffic is on the sugar industry, one would think that it would pay the shipping companies to carry such articles as lime and fertilisers at nominal rates in view of the increased business that would result from the extra output of sugar, the greater prosperity of sugar farmers and others (which would enable them to more frequently travel), and the carriage of a larger number of labourers to deal with enhanced crops.

The Railway Department, at the request of the Bureau of Sugar Experiment Stations, now carries pulverised limestone at ¼d. per mile when the distance exceeds 25 miles.

Lime should be spread broadcast with shovels, selecting the early morning for the purpose when there is little or no wind, and it should be immediately ploughed under. This ploughing should be shallow, as the lime will naturally work through the soil. It is sometimes preferred to harrow the lime in, reserving the ploughing to a few weeks later.

Machines are made to distribute lime, and an implement of this nature can be very well used with pulverised limestone. Lime can also be spread from a dray having a simple arrangement of boards and hessian at the back, but a proper lime-spreading machine is the most satisfactory.

Sulphate of lime, or gypsum, is not recommended for cane soils.

DEEP PLOUGHING AND SUBSOILING.

The use of the tractor for ploughing purposes is now coming into extensive use, in North Queensland especially, and in many places good and inexpensive work is being done by its means. It, however, is of limited use on small areas, where horses are to be preferred. Nearly all the tractors in use pull from two to four discs and burn crude kerosene. The accompanying photograph shows one of these tractors at work.

Land for canegrowing should be cross-ploughed deeply, not less than four times, and well worked up by harrowing and, if necessary, rolling, till it attains a fine state of tilth for planting. Every energy should be bent towards securing the land in perfect heart, remembering that tilth should be secured prior to planting, not after it. With a good deep soil bed in fine order, the best results can be hoped for. In considering this phase of the question, the matter of subsoiling naturally crops up.

The experience at the Mackay Sugar Experiment Station, at Hawaii, and of many Queensland farmers who have tried it, is that subsoiling pays handsomely. The great drawback, under present conditions, is the time occupied in doing the work. With one team of four horses only half the area usually ploughed can be accomplished. The method of subsoiling recommended is to open up a furrow with the swing plough to the depth of the soil usually ploughed, and then to use a subsoiler, which will loosen or stir the soil to the depth of another 6 inches below this, but which will not bring any of this lower soil to the top. At the Station, the depth ploughed varies from 12 to 14 inches and the depth of the subsoil stirring from 6 to 8 inches, thus forming a mass of fine, loose soil for the needs of the crop, while it is also a great help in the conservation of soil moisture. That the roots of the cane will take advantage of deep and subsoil cultivation is shown by the fact that roots have been found at 4 feet deep in loose soils.

The benefit of subsoiling plant crops of cane at Mackay has been most marked. As much as 20 tons more cane per acre has been obtained from land subsoiled than from similar land cultivated in the ordinary way. Further reference to this matter will be made in connection with the subject of ratooning.

NECESSITY OF RESTORING HUMUS TO SOILS.

One of the best methods in preparing land for cane crops is the growth of a green manure crop and its subsequent ploughing under. This is not only a form of rotation which in itself is highly beneficial, but it is a means of restoring humus to our old cane lands, which is a prime essential in the making of a fertile soil. Humus benefits the soil physically—

1. By augmenting its water-holding capacity.
2. By increasing its warmth.
3. By bettering its texture and being a controlling factor in the determination of fine earth.

PLATE 15.

Humus in the soil is lowered by:—

1. The continued growth of crops.
2. Bare fallowing.
3. The continued use of commercial fertilisers.

The best possible crops to grow for green manuring purposes are the legumes, such as cowpea, Mauritius bean, velvet and soya beans, lupins, vetches, &c., and it is strongly recommended that the next device for restoring fertility to the soil, after the liming and subsoiling has taken place, should be the growth of a leguminous crop of some kind for the purpose of ploughing under. In addition to supplying the needed humus, the soil nitrogen supply can be greatly increased by the capture of nitrogen from the air and its fixation in nodules upon the roots of legumes. These crops also supply phosphoric acid, potash, and lime indirectly. Other advantages may be summarised as under—

1. During growth the ground is shaded and moisture is conserved.
2. Erosion of fine earth is prevented during heavy rains.
3. Weed-killing is promoted.
4. The deep tap roots of leguminous plants bring available plant-food from the subsoil to the surface soils.
5. The interposition of a crop, other than cane, that will act in minimising fungoid diseases and insect attacks. If the habitat of parasites attacking the cane is removed for a time, it must result in their dying out or disappearance.
6. Crop rotation.

Nitrogen is the soil element that becomes the most quickly exhausted, as it is also the element that is the most expensive to purchase. The nodules upon the roots of leguminous crops, under favourable conditions, are the abode of countless thousands of bacteria, being themselves minute living plants which have the power of seizing nitrogen from the air. In this way a leguminous crop may get from the atmosphere from 100 to 200 lb. of nitrogen per acre. The best time to plough-in green crops is at the time the seed in the pods is in a milky condition. Some difficulty may be experienced in ploughing under a heavy crop of green fertiliser. By first rolling, then disc-harrowing it, and finally using a plough with a large disc, it becomes an easy matter to successfully cover the crop.

Generally speaking, it takes from six to eight weeks for the crop to rot down. When this has taken place, if the time is convenient, the ground can be got ready for the succeeding cane crop.

DRAINAGE.

If the ground is inclined to become water-logged, or if subject to heavy tropical rains, it would be wise to drain the area to be put under cane. Tile draining is the best form to adopt, but this is usually costly, and good results may frequently be obtained from surface drainage, such as laying the land in beds, with a water furrow between so many rows of cane. These can be led to drains along the headlands if the lay of the land is suitable.

(To be continued.)

TROPICAL AUSTRALIA.

It is not often that we see articles appreciative of the Queensland sugar industry in the Southern Press, but the following by Mr. J. S. Hoskins has been published by the Sydney "Sunday Times," and is worth repeating:—

Mr. Hoskins here gives a picturesque account of a recent tour among the canefields of Northern Queensland, and tells how the great forest lands are being made to yield up some of their vast stores of latent wealth. The work, as he has seen it, is long and hard, but the reward is big, and the successful settler can live in comfort.

"I pushed my way overland to the canefields of North Queensland. I wished to verify the statements so oft repeated of the wonderful potentialities of the country between Ingham and Cairns. I wished to see with my own eyes the beauties, the luxuriance, the wealth. At the first town I visited I arranged to be called by a cane-cutter on his way to work, and it was still dark when a voice beside me called, 'Come on, stranger, we are getting away now.'

"We had some bread and tea, and strolled off to a 15-acre patch of cane. There was a gang of twelve very soon on the ground. They were dressed simply enough—in sleeveless shirts open at the front, light trousers, and broad-brimmed hats. Some wore boots and socks, some boots without socks, and some no boots at all. They were mostly Italians, but among the dozen men were representatives of five different nationalities.

"When work began there was barely sufficient light to guide the long, broad knives with that unerring swish upon the cane. There had been the usual heavy tropical dew, and the sheath-like leaves poured a stream of moisture down the backs of the perspiring workmen. But they appeared not to be discomfited; they laughed and joked over their work, and yet kept busy hewing into the long juicy stalks.

"How the Cane is Cut.

"With one stroke of the knife the cane is severed as closely as possible to the ground; a few rapid strokes, and the leaves and top are off, leaving just the long, bare stalks. Another quick movement, and it is thrown back on to a heap ready for loading. So the work goes on till breakfast time, when a halt is called. By this time the sun is already climbing up; the moisture has risen in a great white mist, and everything is dry except the sweat-laden clothing of the workers.

"When sufficient cane is cut the knives are laid aside, and the more strenuous work of loading is begun. The Colonial Sugar Refining Company, which has tremendous interests all along the sugar areas, runs light lines right into the fields. Along the roads contiguous to the cane farms permanent tramlines are laid, and at convenient places are made junctions to link up with the various crops on either side. These portable lines, which facilitate loading to a wonderful degree, are in small sections, easily handled and quickly laid. A string of forty or fifty trucks, according to the needs of the farmer, is pulled out to the junction from the company's sheds and shunted off. The trucks are taken from there by a team of horses and run over the previously laid temporary line right along the little heaped-up rows of cut cane.

"Heavy Work Loading.

"I had a try at loading cane myself, and found it mighty hard work. The cane, which was anything up to 15 ft. in length and as heavy as lead, had a habit of swinging up under my nose and spreading out in all directions when I attempted to put a bundle on my shoulder. I found that four lengths of cane were as much as I could conveniently carry, while others were swinging along seemingly easily enough with three times that amount. All the men in this gang were on contract work, and consequently they worked at a tremendous pace. They were averaging upwards of £2 per day, working long hours and keeping apparently healthy.

"Of course, the great majority of these workmen have a spell of from two to four or even five hours in the hottest part of the day. They consider that they do better work, more work, and feel healthier by starting at daylight in the morning, spelling through the middle of the day, and then working till dark.

"ITALIANS JOYOUS, BUT THRIFTY.

"In all these cane districts which I visited there were great numbers of Italians. At night, after the long day's work is through, they seek pleasure in the wineshops and public houses. They sing the songs of old Italy to the accompaniment of scratchy violins, and phonographs are heard in almost every house. Dozens of swarthy faces are seen behind the hotel bars. There is a clink of glasses, a shout in Italian, a chorus song, and some conversation in broken English to some Australian workers, who, too, join in the festivities. In the little rooms off the bar are men of several nationalities, grouped around a table playing cards, and arguing and winning and losing. There is a ceaseless click, click of billiard balls right up to the hour of closing. It is a gay life when the cane season is in full swing, for money is plentiful, and the North is kind.

"But for all his pleasures the Italian is a thrifty fellow, and he knows good land when he sees it. The great majority of these men have little desire to return to their homes across the water. Rather, they induce their relatives and friends to join them in this great, free country. They club together in twos and threes and half-dozens, buy up land, work it all they know, save up and buy more land, until to-day by far the greatest proportion of land is owned by Southern Europeans.

"POSSIBILITIES FOR REPATRIATION.

"I understand that a lot of this country is being opened up for repatriation purposes, and I am glad to hear it. For this is wonderfully rich country, and men with any of the elements of success in them cannot help but win out in the sugar areas. I stayed with and talked to many selectors, some just starting, and some of years' standing and successful. The story is always the same. It is one of perseverance and pluck against all odds.

"A selector is fortunate in securing a piece of land. He goes out to see it. For a moment, as he looks at the great trees standing so closely together, and rests his eye upon the tangled undergrowth, he doubts his strength. He wonders if he can ever convert that primitive forest into cultivation. But his doubts are dispelled by deep desire and decision. He is an Australian, and the pioneering blood courses freely through his veins. He sees all around him prosperity, and knows himself poor. He sees on one side happy homes, commodious dwellings, fields of pasture, and waving cane, flower gardens, lawns, and vegetable plots. On the other side, standing forest, dark and impenetrable. That's his side.

"THE GREAT UNDERTAKING.

"But all the country was once like that, and with that knowledge he takes heart. As he stands there in silent meditation he creates a mental picture of the home he is going to build right in that forest. Next morning an axe is heard ringing on the trees of the new selection, and the realisation of the mental picture has begun. He sets to with a will, and soon before his persistent efforts a small patch is cleared. The valuable trees are sent to a sawmill and converted into hard cash. The scrub is burned off, and, excepting for the great stumps of the trees, the first patch is cleared. The cane is planted between the stumps and nourished by the never-failing tropical rains soon pokes its head up into the warm sunlight, and grows to maturity. The first season's crop is cut and sold, and the goal seems now within reach. More is cleared; more cane is scrub planted; the tent gives place to the humpy; the humpy gives place to the home of the settler's dreams.

"In the first years the cane was planted right up to the door of the house; but now there is a large plot set aside for flowers and fruit and vegetables. And what varieties are grown in these districts! Bananas and potatoes, oranges, lemons, tomatoes, cabbages, pineapples—they all grow in abundance. All that grows in the tropics and most Southern vegetables, &c., thrive exceedingly here. It is a truly wonderful belt of country. It is no wonder that the steady cane farmer is doing so well, and these settlements are growing and thriving. A few years of work, and men who have started off scratch in absolutely virgin country, have won out and made beautiful homes.

"Tropical Australia beckons to her stalwart sons to come and seek their fortunes. The North is lavish in her kindnesses to those who are kind to themselves, to those who will recognise that there is no substitute for success but work, to those who can smile alike at hardship and prosperity, and, having created an ideal, dare to strive on to its fulfilment."—"Sunday Times."

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, F.L.S., Government Botanist.

No. 15.

ON TWO SPECIES OF LABIATÆ NATURALISED IN NORTHERN QUEENSLAND.

(*a*) *Hyptis suaveolens*, Poit.*

Description.—A coarse strong-scented herb, 2-6 ft. high. Stems and leaves hairy. Leaves 1-3 in. long, petiolate (stalked) broadly ovate, edges irregularly toothed. Flowers blue, in false whorls in the axils of the leaves; sometimes in the upper part of the plant forming narrow panicles. Fruiting calyx, 3-4 lines long, strongly 10-ribbed, each alternate rib produced into a subulate tooth.

Distribution.—A native of Tropical America; now a widely-spread weed over the tropics generally. Has been received as a naturalised weed from Thursday Island (E. Cowley), Cooktown (G. Tucker), and Townsville (Rev. N. Michael). It is also very abundant about Port Moresby, Papua.

Common Names.—I know of no English name applied to it in Australia or elsewhere. Various native names are given to it in different parts of the world, but the botanical one is short and euphonious enough for popular use.

(*b*) *Leucas zeylanica*, R.Br.

Description.—An erect coarse annual herb, with quadrangular hispid-hairy branches. Leaves 1-3 in. long, narrow-lanceolate, edges rather distantly toothed. Flowers white, crowded, forming terminal heads with numerous linear bristle-like bracts. Calyx funnel-shaped, mouth oblique. Nutlets brown and shining.

Distribution.—A native of Tropical Asia; has become naturalised about Cairns (C. T. White), and about the Mulgrave River (Rev. N. Michael).

Common Names.—The same remarks apply here as to the previous plant.

Eradication.—So far, these plants have not manifested themselves as particularly aggressive weeds, and hand-pulling or hoeing out—especially prior to seeding—or with the larger plants cutting off below the surface of the soil and burning, should prove easy enough.

* For the identification of this plant I am indebted to the Director, Royal Botanic Gardens, Kew, England.

A WEEVIL ATTACKING CAMBODIA COTTON (INDIA).

We are not aware that any Indian cotton has been imported into Queensland, but if so, it may be well to bear in mind what the Acting Government Entomologist, Madras Agricultural Department, writes in the "Year Book" of that Department for 1918, concerning a small beetle pest of cotton, called the "Stem Weevil," an insect about an eighth of an inch long, resembling more or less, the rice beetle.

This insect appears to be confined to the Coimbatore district. In none of the other cotton tracts of South India has it been noted. There is not sufficient ground yet to state with any amount of authority that the insect is one of the many introduced forms in India. But, that it should be found in widely distant areas, such as Behar and Coimbatore, without being found anywhere between these two, shows something surprising regarding the distribution and occurrence of this insect. The adult weevil is not directly concerned in the damage to the plant. It is the young one called the "grub" that causes the damage to the plant stem. The short, thick-set, smooth, fleshy grub bores through the stem tissue, and affects the growing plants seriously. All affected plants can easily be detected by the presence of gall-like swellings on the lower regions of the stem usually just above ground level. . . . When young plants are attacked, they are, in most cases, killed, as the slender stem is unable to stand the attack. In the case of those grown up (say, four or five months), though the stem is infested and nodes are formed, though many dry up altogether, several plants withstand the same. A strong wind, however, lodges the heavier plants, the stem getting bent just near the nodular swelling. . . . In bad cases the loss may be put down to be from 15 to 20 per cent. of the usual out-turn.

PLATE 16.—HYPTIS SUAVEOLENS, *Poit*

PLATE 17.—LEUCAS ZEYLANICA, *R. Br.*

Entomology.

CANE GRUB INVESTIGATION.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report upon Cane Grub Investigation, from the Entomologist, Dr. J. F. Illingworth:—

"As is usual at this season, the clear cold weather has sent all the grubs deep into the soil; and the lowered temperature has had an excellent effect upon the cane, increasing the density. Fortunately, there has been no heavy wind and most of the cane injured by grubs has remained standing, so that it is cutting out well.

"Considerable time during the past month has been spent in the breeding and liberation of the Tachinid parasites of the borer beetle, which I recently brought from the Mossman district.

"HARVESTING AT GREENHILLS.

"The cane of the infested area on this estate is giving unexpected results. For a time, after the grubs made their appearance, most of this cane appeared to be doomed. The continued rains, however, saved the day, and since little of the cane fell down it has not deteriorated materially.

"The early-planted cane in field F3, referred to in several preceding reports, is now being cut. It will be recalled that one-half of this field was treated with a green crop of Mauritius beans previous to planting, while the remainder of the field was left fallow. The devastation of the grubs became apparent on the fallowed portion fully three weeks before it began to show on the treated area. In fact, I think that if the rains had not been so delayed, the cane in the bean-plot would have carried over with little sign of injury. Due to the combined action of the grubs and the continued drought, however, the cane of both areas was very brown in April, and gave every appearance that it was doomed.

"It is encouraging, therefore, to be able to report that a remarkable crop is now being harvested on the bean-area. The Badila sticks are very heavy, and average 4 to 5 feet in length. These results are in marked contrast to the fallowed portion of the field, where the cane is badly stunted and shows only about half the length of sticks. Later, I shall be able to present figures showing the weight per acre on each of these areas, which, I am satisfied, will demonstrate the value of green manuring on these grub-infested red soils.

"ARSENIC FOR GRUBS.

"I recently learned from Mr. R. Blackwell, a farmer at Riverstone, near Gordonvale, that he was applying arsenic for grubs in the drill with meatworks manure at the time of planting. He told me that he was using the arsenious acid (white arsenic) at the rate of 70 lb. per acre, and that he was using this amount upon the advice of a grower at Innisfail. Three hundredweight had been applied at the time of my visit, and as much more was to be put in as soon as it was procurable. The poison was mixed in the manure spreader at the rate of about 20 lb. per bag of the manure, which was applied at the rate of about 5 cwt. per acre.

"As will be noted from my last report, this is the amount of poison used by Mr. C. E. La Caze, on the Herbert River, years ago. Undoubtedly this amount is excessive; and though it may not injure the cane, it is expensive, if used on a large scale. Probably 20 lb. of arsenic will be found to give just as good results where it is centralised by placing it with the plants in the bottom of the drill. At any rate, our results on the Meringa plots would point to this conclusion.

"BEETLE BORER PARASITES.

"The beetle borer is becoming increasingly prevalent in the Cairns district, particularly in the rainy portions. This is probably due to the cyclone-damaged cane last season, and to the fact that it is sometimes not possible to get a good burn on the trash in the wet areas. Then, too, there has not been sufficient care in the selection of plants. Apparently a very few of this pest, introduced with the seed, are able to populate the field in a single season, so that even the plant cane is considerably damaged. As has been pointed out, it is not so much the cane eaten by these beetles and their grubs, considerable as it often is, but far greater is the deteriorating effect on the whole shoot. Usually, the first injury is near the ground, cutting off the supply of sap, hence growth is hindered and deterioration soon sets in. About 350 of the parasites were secured on my last trip to Mossman, during June, and these have been cared for in a large cage, located in a borer-infested

field at Meringa. From time to time small lots of flies have been liberated here, after they have mated in the cage. Also, from this lot I have small colonies of the flies at Moolaba, Babinda, and Gordonvale.

"At Moolaba I placed the flies in the twelve-months-old plant cane on the farm of Mr. P. C. H. Rutherford on 16th June. Though this is new land at the back of the farm it is full of borers, which should give the flies every inducement to get right to work. Young plant cane, three months old, is alongside, and there is a great expanse of cane up and down the valley for miles, since this farm is about the centre of three blocks of 1,280 acres each. Most of the cane in this region of abundant rains is of rank growth, hence ideally suited to the work of the beetle-borer.

"Dr. Knowles, at Babinda, called my attention to considerable damage on his estate by borers, and I made arrangements with him to leave a small area unburned, where I liberated a colony of the flies. A lot of the borer-infested cane had fallen, and ants (*Pheidole megacephala*) were exceedingly abundant, cleaning out the old borer channels, which they live in during the wet season. I noted that one of these predators seized one of my flies by the foot, while it was feeding on cane juice, just after being liberated. The poor fly appeared to be helpless as if paralysed by the death grip of the ant, but after I removed it she flew away as if in perfect condition. This helps one to understand the difficulties of establishing these friendly insects when their enemies are omnipresent. Fortunately, there are few jumping spiders in the cane fields here; for I found that at Fiji they were eternally after the flies.

"At Gordonvale two colonies of the mated flies were liberated on the farm of Mr. R. Blackwell, on the Riverstone road. His fields were seriously affected with borers last season, and I found that even his young plant cane is infested. There is a considerable infested area in this immediate region, so that the flies will find plenty to do if they once become established.

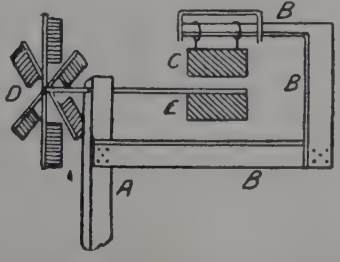
"While at Moolaba, I found that the cutters were in the field where Mr. Girault liberated the flies last year. Borers were found to be plentiful, but after a careful examination of infested stalks near the box where the parasites were liberated, I failed to find any evidence of the flies. It will be recalled that ants got into the box of canes containing the parasites, so these predators may have destroyed all of them as they emerged.

"I found similar negative results when I examined the cane on Dr. Reed's farm at Babinda. Mr. Girault took a box of canes for this farm at the time that he located those at Moolaba. This box was also placed so that ants got into it before the flies had emerged, and I doubt if any got away safely.

"By the present method of liberating the flies, after they have mated in the large cage, they will undoubtedly have a better opportunity to escape their mortal enemies and establish themselves."

A BIRD SCARE.

Many are the devices for keeping birds, especially sparrows, from our flower and vegetable beds. The accompanying sketch, taken from the "South African Farmers' Advocate," appears to be what is required in Queensland gardens to scare away the sparrow. It is well worth a trial, where black cotton, imitation hawks, &c., have failed.



This contrivance is very useful to scare birds from peas and small seeds in the garden, and half a dozen have been effective in an orchard block. This is the method of making: Fasten six pieces of cardboard or thin pieces of wood to sticks, and attach them all to a rod, as at D. This rod goes through a hole in the post A. On the end of the rod D fasten a piece of wood, E, so that when it revolves it will knock against the piece of tin, C, swinging from B. All the frames lettered B are fastened to the post A. The faster the wind carries D around, the more noise is made.

Science.

WATER-DIVINING.

BY ARTHUR MORRY.

Mr. Arthur Morry, Surveyor to the Department of Agriculture, has contributed to the "Daily Mail" the following paper on the above subject. Mr. Morry has not only been successful in locating underground streams, but he has also been able to state whether the water is salt or fresh, at what depth it may be found, and even the width and depth of the stream.

An instance of his powers in this vital problem of locating water was lately shown by the discovery of a running underground stream of water at Indooroopilly on Mr. Carr's Jersey Stud Farm.

Early in August, at Mr. Carr's request, he visited the farm with the object of trying to secure a good water supply for his valuable stock:—

"A well was already in existence, the water of which was intensely salt. Within a few minutes a site was pointed out, not more than 50 yards from the existing salt well, where it was stated a plentiful supply of good water would be obtained in a bed 20 yards wide crossing the salt stream almost at right angles, at a depth of not more than 20 feet. On Saturday afternoon, 2nd August, I received a 'phone message from Mr. Carr, stating that a good supply of splendid water had just been reached in a bed of gravel after sinking through 15 feet of clay, the water coming in so fast that further sinking was unnecessary. The bearings of both these streams were taken, when on the ground, and it was calculated that they crossed each other almost at right angles, within a distance of from 10 to 15 feet. The result of the sinking has proved the diagnosis to be almost absolutely correct. Mr. Carr is a member of the Indooroopilly Shire Council, and can substantiate these statements.

"There is nothing 'supernatural' about this, which is only one of many similar cases I could mention; what I am anxious to know is: What is the power that enables this to done? Could any geologist have gone on to that farm, and in a few minutes have determined the site of a fresh water supply as distinguished from salt? With most, if not all, diviners, the rod or wire will only indicate moving water. At Ayr, in the Burdekin delta, on the Don River, near Bowen, again at Cairns, and other places, water may be obtained almost anywhere by putting down a 'spear' but the rod will not indicate that, in my hands, at all events; but where that underground water is slowly finding its way to the outlet, whether it be the river or the ocean, these streams, no matter how slowly they are moving, can be detected. On the esplanade at Cairns one moonlight night I detected six such overflows passing into the ocean.

"There are still many like 'Geologist' who persistently regard it as a 'superstition' simply because they cannot understand it. In support of that view 'Geologist' gives his experiences with a squatter friend in New South Wales, who thought he possessed this power of finding water and selected a site for himself, which, alas! yielded no results at 120 ft. But how many of our subartesian supplies are obtained at depths much greater than that? No, we are not misled or misguided by what he calls the will-o'-the wisp mysticism, instead of sound reason; the reason is on the side of those who plead for scientific research, and for its persistent pursuit until the problem is solved. If great scientists like Sir Oliver Lodge and other eminent University professors who have grappled with it have not so far succeeded, there is no reason why others in the light of further knowledge may not be more successful. There is more known about water-divining to-day than ever before, and it would be a splendid discovery for our young Australian scientists to be able to reduce the theories which have been advanced to facts, or to establish this as a branch of science on a firm foundation.

"'Geologist' states that a diviner may be successful in well-defined subartesian country, but that in basaltic or granitic country he would be at fault, because in those areas water is only to be found in the cracks and fissures of the rocks. Now, this is the very country in which the divining-rod has been remarkably successful in discovering these fissures, with an inexhaustible supply. I have a friend who operated a power-driven boring plant in country of this description on the 'no water-no-pay principle.' His sites were selected by himself with the divining rod, and in no case did he fail to secure a supply and to draw his fee, though the drilling was, in nearly all cases, through hard granite.

"Another correspondent, W. Rutland, asks if any modern geologist has expressed his belief in the theories enunciated. I cannot name one, and I do not expect to hear of such a one until the idea is dissipated that it is impossible for geology and water-finding, as at present practised, to work together. He also relates his experiences, which inclined him to be sceptical, because water had not been found at 30 ft. when it was expected at 20 ft: but water-divining is not yet an exact science, and the depth, so far as my own experience goes, can only be stated approximately, but in many cases it is remarkably correct. Twelve years ago I was as sceptical as anyone. By accident I discovered I possessed the faculty, or whatever it may be called, and since then I have selected scores of sites, and in every case, where tested, they have been successful. Before discovering the method of detecting salt from fresh water, in several cases the former was obtained, but since that discovery no mistakes are possible with due care, although it often happens that a salt stream may be passed through before reaching the fresh water.

"Again, I appeal to our scientists to make this a matter of study. In a country like this, where water is of the utmost importance, no means of discovering its location should be ignored. My position brings me in almost daily touch with those who are crying out urgently for water—water everywhere—and it is painful to think that it is not secured when in most cases it is easily within reach, and at a moderate cost, if it was only known.

"I should like to see a committee of investigators formed consisting of a few geologists, chemists, electricians, engineers, and agriculturists, who would thoroughly test in every way the remarkable phenomenon of water-divining, especially the recent discoveries to which reference has been made; and as an operator myself I invite the closest scrutiny."

PONDS ON TOP OF HILLS.

CONSERVATION OF WATER.

Jack and Jill, according to the old rhyme, went up the hill to fetch a pail of water (says C.B. in the London "Daily Mail"). That this statement may not have been purely poetical licence seems to me proved by the fact that high on the South Downs are to be seen many ponds, which, though not fed by springs or surface drainage, yet maintain a supply of water for stock even in the hottest and driest summers.

These "dew" ponds or "mist" ponds, as they are called in Surrey, are of enormous antiquity, and are said to have been used to supply the hill camps of Neolithic man.

Naturally such ponds are of the greatest value to farmers and shepherds, and of late years investigations have been carried out with a view to discovering the secret of their constant supply. These investigations go to show that the term "mist" pond is probably the true one, and that the water comes, not from dew, which, after all, must be an insignificant contribution, but from mist, or wet fog. These mists are of two kinds—the summer mist of a still and cloudless night, and the driving mist produced by a wet south-west wind on the sea.

SUPPLIES REPLENISHED.

The secret of making these pools is to dig them with a wide, gently sloping margin, and to make the bottom as watertight as possible. In Young's "Agriculture of Sussex," published in the year 1808, it is stated that "many farmers in the neighbourhood of Eastbourne have been at great trouble and expense in forming these ponds, which is done by lining them with chalk puddled and trod down till it makes a kind of plaster floor."

A pond on the top of Friston Hill which has never gone dry has the bottom paved with small flints set in puddled chalk.

On the western side of the Weald, clay is used, rammed hard. This is covered with a "putty" of lime. Upon this comes a layer of straw, then 10 in. or 12 in. of chalk rubble. The straw lining is no doubt meant to act as an insulator.

More recently, dew ponds on the Dorsetshire Downs have been lined with concrete, and have proved successful in holding and keeping water.

The higher the situation of the pond and the more exposed the more constant seems the supply of water. Two of these ponds near Chanctonbury have yielded water when ponds in the valley below were quite dried up. From others as many as fifty sheep have been watered daily without exhausting the supply.—*Exchange.*

General Notes.

PLANTAIN FLOUR.

A paragraph appeared in the "Daily Mail" of 31st July, concerning a suggestion from the North, that, in view of the dearth of wheaten flour, a very good substitute might be found in banana or plantain flour. The Director of Fruit Culture, however, pointed out that the selling value of the banana itself, and the food value of ripe bananas without treatment, was too great in each case to warrant any trouble or expense in converting it into flour.

"Tropical Life," Ceylon, in its issue of June, 1919, publishes the following extract from the "Bulletin of the Department of Agriculture," of Trinidad and Tobago, vol. xvi., No. 2, entitled—

NOTES ON THE PREPARATION OF FLOUR SUBSTITUTES, by R. V. Williams, Curator, Royal Botanic Garden, Trinidad.

"As a substitute for wheaten flour, plantain flour is probably one that will be made the greatest use of, as it is the cheapest to produce. We have also a number of other starchy foods that can be used, some of which will be described in detail.

"Plantain flour can be made from any kind of plantain, although it is generally recommended to use those plantains such as the "Red fig" which at the present time are scarcely used at all in Trinidad. On some large estates quantities of this plantain can be seen. From a bunch of silk figs the hands were cut off and weighed; they yielded 26.19 per cent. of flour.

"When cutting the plantains, it is better to cut them before they are quite full than to leave them till they are beginning to ripen, as if too full, they will, after slicing, ripen in the sun, be very difficult to dry and produce a sweet flour. The process of peeling and slicing is a simple one, and can be done most economically by boy labour, the boys becoming quite expert and performing the work quickly and well after a few bunches have been done. Steel knives should not be used on the green fruit as they blacken them unless immersed under water the whole time. A nickel or fruit knife is the best tool to use.

"When slicing the plantains the thinner they can be cut the better, as it is essential for them to dry quickly. In the dry season no trouble is experienced, and they will dry thoroughly in a couple of days if spread on wooden trays in the blazing sun. In the rainy season it is a different matter and it is best to choose a fine morning for the work, and if a shower comes on remove them to a dry warm room. A drying room with hot air going through it would be necessary on a large scale, but when doing a few bunches for the home, this is not needed as they can always be dried in trays on a warm grate. As soon as the chips are dry they are ready for milling. On a small scale they may be pounded, grated, or better still ground in an ordinary corn-mill which can be bought from about two dollars upward. After buying the plantains and paying for the labour, the flour can be produced for about three cents a pound; therefore for those who grow their own plantains and use their own labour, the cost is practically nil.

"The uses of plantain flour are many and varied: It would be as well here to mention that as a food substitute plantain flour is most valuable, it being very digestible; so much so, in fact, that well-known medical authorities have recommended its use for the feeding of children and invalids; we need therefore have no fear of bad consequences to our health by using plantain flour.

"Plantain bread is best made from a mixture of wheaten flour and plantain flour, but in what proportion is a question for the consumer to judge for himself. Personally, I use it and find it very wholesome, mixed in the proportion of two parts plantain flour to one of wheat flour, other people may prefer it half and half, or one part of plantain flour to two of wheat flour. The bread is dark in colour, or lighter according to the amount of wheat flour added, this probably being the only reason why some people prefer the addition of wheat flour in large proportions. The addition of a certain proportion of wheat flour is necessary to give the bread the proper consistency.

"The making of bread can easily be done by the housewife. Occasionally for some reason a little difficulty is found in getting the plantain flour to rise, when the dough is made with yeast, and it has been recommended to set the doughs separately and combine them kneading. A similar process, I think, is to make the bread with

baking powder, when it never fails to rise. Take care in mixing, however, not to make the flours too wet, as the plantain flour is not capable of taking up so much moisture as the wheat flour.

"Plantain flour cooked and eaten as oatmeal porridge is an excellent food and should entirely replace oatmeal on the breakfast table at the present time.

"In cake making, the same proportions of plantain flour can be used as in the making of bread.

"Used in the form of a milk pudding, made in the same way as a rice pudding, it is also very palatable.

"Plantain biscuits can also be made from the flour, in fact they have been known in Europe as a fancy biscuit for a long time."

CURING THE LEMON.

PRACTICAL HINTS.

In response to a request from an interested reader for information concerning the curing of the lemon, we publish the following excerpts from "Fruit World" Mr. W. J. Allen's book on "Citrus Culture":—

While there is no country where lemons will thrive better than in Australia, and perhaps none where the fruit can be more easily cured than in the drier parts, some difficulty has been found, on the other hand, in curing them where they have been growing along the coast, where there is more humidity in the atmosphere. They can, however, at least, be kept for a short time after picking—long enough, at any rate, to greatly improve the condition of the fruit. No one can fail to notice the difference between a cured and uncured lemon. The one has a nice fine skin, and is full of juice, whilst the other is hard and thick-skinned, and it is difficult to extract the juice.

To begin with, the fruit must be picked carefully, and not handled like potatoes, but more after the manner of handling eggs, as decay is liable to set up in any bruised part. The method of procedure should be quite different to that now practised by a majority of growers, who simply pull the fruit from the tree in a very careless manner, and, in a still more careless fashion, roll or drop them into a basket or case, and these, in turn, are again dumped into another receptacle, perhaps a cart, without any regard as to whether bruising is caused in the process or not. From the cart the fruit is very often simply packed into cases, without any pretence at curing.

During those years when lemons are scarce they frequently command good prices, even though handled in this way; but during normal seasons there is generally a month or two, when the bulk of the fruit is ripening, when the grower is not moved to exuberance over his returns. If then, by some means, he could tide over such a season, by holding the bulk of his lemons until the markets assume a more favourable tone, it would make a material difference in his income.

A start should be made by picking a portion of the crop before it becomes too ripe—during the months of May, June, and July—and store such fruit away in well-ventilated, dry cool buildings either in boxes or trays, and see if by handling the fruit carefully it will not keep until there is more demand for it. It is always more easy to store small than large quantities; therefore the larger the quantity to be experimented with, the more careful will the grower have to be about the building in which he keeps his fruit. A small closed room may be a capital place in which to keep a few lemons, but perhaps not at all suitable if the room was filled with fruit. We neither want the lemon to sweat, nor do we want it to shrivel; and if we can strike the happy medium, we are on the right track.

It has been demonstrated, both here and in California, that lemons keep best when pulled just as they are beginning to turn ripe, and that, on the contrary, they do not keep so well when allowed to hang until quite ripe.

They are best picked as soon as they are about 2½ in. in diameter. When they are over 2¾ in. they are over size, except for making lemon peel, when a good thick-skinned 3 in. lemon suits addmirably. But we are now talking of lemons for curing, and for this purpose they should be picked when they attain the proper size, even though almost green. They should be allowed to stand for a few days and then packed away in paper-lined boxes, which may be stacked in blocks in such a manner as to permit a free circulation of air around each case.

A packing-house in use by Mr. Lippingwell, of Whittier, gives a fair idea of what a curing-house should be. The building is large and airy, being 250 ft. long and 150 ft. wide, and is about 3 ft. clear of the ground. This gives a good circulation of air beneath the floor, which is most important. There are no permanent partitions in the building; the stacks of cases are arranged in blocks of four, separated by a narrow space of about 2 ft.; these blocks run in rows the length of the building, being separated by a passage about 4 ft. wide running transversely. The rows thus formed are placed 12 ft. apart; in this way a large passage or alley-way is left for packing, &c. [The curing and packing house described here is an exceedingly large one, but should form a basis from which the requirements of growers could be estimated, and reduced proportionately to meet same.—Ed. "F.W."]

In California the blocks of cases are so built that a canvas covering, 10 ft. x 10 ft. x 20 ft., made box-shape, will cover them, the canvas being open at the four corners, and the corners so arranged that they may be laced quite tight, or, if necessary, loosened, and the sides of the box or tent raised so as to admit more air and allow any superfluous moisture to escape. After the fruit has been stored for a few weeks, the sides of the tent seldom require raising if the curling-shed is well ventilated. If it is found that the lemons are keeping well, they may be left under the covering for several months until they are thin-skinned and pliable; but they should be marketed before the skin begins to harden in the least. If any of the lemons are decaying in the cases, the fruit may be sorted over every month or six weeks, and all specimens removed which show signs of decay or loss of condition.

The method described is the best that has been practised up to the present, but I think that before many years even this will be improved upon. The object in curing lemons is to reduce the thickness of the peel and make it tough—to increase juiciness and to maintain a good condition for a favourable market.

ARMY'S AIRCRAFT TO COMBAT FIRES.

Army airplanes and captive balloons will cover portions of the national forests of California, Arizona, New Mexico, and other States this summer, to aid in detecting and suppressing forest fires. In compliance with an order from Secretary Baker directing the Air Service to co-operate with the Forest Service of the United States Department of Agriculture in this work, conferences are under way to determine where and to what extent the air scouts will supplement the forest rangers.

That there is a distinct and important place for aircraft in fire protection of timber lands is regarded by the Forestry officials as beyond doubt, but experimental trial of methods and possibilities will have to be the first step. This is now being planned for the coming fire season. Army airdromes and bases will be utilised for the experiments. Some of the bases near enough to national forests to be used advantageously are the flying fields at San Diego, Riverside, and Arcadia in southern California. Other points in the West and in the East are under consideration, including one near the White Mountains in New Hampshire.

One of the interesting possibilities to be tested is bombing fires to put them out. It is believed that bombs charged with suitable chemicals can be used with good results. Another plan to be tested is transporting fire fighters by dirigibles from which ladders can be lowered to the ground.

The chief use of the aircraft this summer, however, will be for fire detection. At present the Forest Service relies for this partly on patrol, usually by men on horses, motor cycles, or railroad speeders, and partly on watchers stationed at lookout points. Aircraft have many points of obvious superiority for both classes of detection work.

Lookouts in a very broken country, cut up by deep canyons or where mountain ridges obstruct the view, or in a flat country that affords no good points of vantage, are often unable to pick up all fires quickly by the rising smoke, or to locate them accurately. For precise location the system in use depends on triangulation through reports telephoned from separate observation points. Airplanes would use wireless in reporting fires, as they have done in communicating with the artillery, and would locate fires by co-ordinates in the same way that gunfire in war is directed to a particular spot or object.

From the Army standpoint, the use of aircraft in protecting the national forests affords a valuable opportunity for training fliers and developing further the possibilities of aircraft and the art of flying.—"Hawaiian Forester."

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR AUGUST, 1919.

Article		AUGUST. Prices.
Bacon	lb.	11½d.
Barley	bush.	5s. 3d.
Bran	ton	£8 15s.
Broom Millet	„	£30 to £40
Broom Millet (Sydney price)		£65
Butter (First Grade)	cwt.	177s. 4d.
Chaff, Mixed	ton	£8 1(s. to £10
Chaff, Oaten	„	£10 15s to £13 5s.
Chaff, Lucerne	„	£12 10s. to £15 15s.
Chaff, Wheaten	„	£8 7s. 6d. to £10 15s.
Cheese	lb.	11d.
Flour	ton	£14
Hams	lb.	1s. 3d. to 1s. 10d.
Hay, Lucerne	ton	£11 10s. to £12 15s.
Hay, Oaten	„	£13 15s.
Hay, Wheaten	„	£8 to £10 10s.
Honey	lb.	5d. to 5¾d.
Maize	bush.	6s. 9d. to 7s. 4d.
Oats	„	8s.
Onions	ton	£23 to £26 10s.
Peanuts	lb.	5d. to 6d.
Pollard	ton	£9 5s. to £10 5s.
Potatoes	„	£16 to £24 15s.
Potatoes (Sweet)	cwt.	8s. 2d. to 10s. 4d.
Pumpkins (Cattle)	ton	£2 10s. to £4 5s.
Eggs	doz.	10d. to 1s. 2d.
Fowls	per pair	5s. to 12s.
Ducks, English	„	3s. 6d. to 5s. 3d.
Ducks, Muscovy	„	3s. 6d. to 10s.
Geese	„	6s. to 8s.
Turkeys (Hens)	„	14s. to 16s.
Turkeys (Gobblers)	„	32s. to 40s.
Wheat (Milling)	bush.	5s. 3d.

VEGETABLES—TURBOT STREET MARKETS.

Beans, per sugar-bag	10s. to 14s. 6d.
Beetroot, per dozen bundles	1s. to 1s. 6d.
Cabbages, per dozen	2s. 5d. to 8s. 6d.
Carrots, per dozen bunches	9d. to 1s.
Cauliflowers, dozen	4s. to 20s.
Celery, per bundle	1s. 6d. to 2s. 3d.
Cucumbers, per dozen	1s. to 1s. 3d.
Lettuce, per dozen	6d. to 1s.
Marrows, per dozen	1s. to 2s. 6d.
Parsnips, per dozen bunches	...
Peas, per sugar-bag	7s. 6d. to 12s.
Potatoes (Sweet), per cwt.	8s. 2d. to 9s. 3d.
Pumpkins (table), per cwt.	2s. to 4s.
Tomatoes, per quarter-case	4s. to 10s. 6d.
Tomatoes (inferior), per quarter-case	1s. 6d. to 6s.
Turnips, per doz. bunches	3s. to 4s.
Turnips (Swedes), per cwt.	1s. 6d. to 3s. 9d.

SOUTHERN FRUIT MARKETS.

Article.	AUGUST. Prices.
Bananas (Queensland), per case ...	...
Bananas (Tweed River), per case	20s. to 24s.
Lemons (Victorian) per bushel-case	10s. to 12s.
Mandarins (Queensland), per bushel-case	11s. to 14s.
Oranges (Queensland), per bushel-case	11s. to 13s.
Oranges (Navel) per case ...	14s. to 15s.
Passion Fruit (Victorian), per bushel-case	16s. to 25s.
Pears, per half-bushel case	4s. to 8s.
Pineapples (Queens), per double-case	12s. to 13s.
Pineapples (Ripleys), per double-case	7s. to 9s.
Pineapples (Common), per double-case	7s. to 11s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Apples, Eating, per bushel-case	16s. to 20s.
Apples, Cooking, per bushel-case	8s. to 12s.
Bananas (Cavendish), per dozen	4d. to 10½d.
Bananas (Special), per dozen	1s. 6d.
Bananas (Sugar), per dozen	3d. to 8d.
Cape Gooseberries, per box	6s. to 16s.
Citrons, per cwt.	7s. to 12s.
Cocoanuts, per sack	15s. to 25s.
Custard Apples, per quarter-case	4s. to 10s. 6d.
Lemons (Lisbon), per half-case	3s. 6d. to 6s. 6d.
Lemons (Imported), per bushel-case	14s. to 17s.
Lemons (Rough), per bushel-case	3s. to 4s.
Loquats, per case	5s. to 9s.
Mandarins, per case	6s. to 17s 6d.
Oranges, per case	4s. to 15s.
Oranges (Navel), per case	14s. to 18s.
Oranges (Seville), per cwt.	12s. to 17s.
Papaw Apples, per quarter-case	1s. 6d. to 5s.
Passion Fruit, per sugar-bag	4s. 6d. to 8s. 5d.
Peanuts, per lb.	4d. to 6d.
Pears, per case	14s. to 17s. 6d.
Pineapples (Rough), per dozen	2s. to 4s.
Pineapples (Smooth), per dozen	6s. 6d. to 8s. 6d.
Pineapples (Ripley), per dozen	2s. 6d. to 4s. 6d.
Rosellas, per sugar-bag	4s. 6d. to 5s. 9d.
Tomatoes (prime), per quarter-case	6s. to 8s.
Tomatoes (inferior), per quarter-case	2s. to 4s.
Strawberries, per dozen boxes	6s. to 15s.

TOP PRICES, ENOGGERA YARDS, JULY, 1919.

Animal.	JULY. Prices.
Bullocks	£21 10s. to £24
Cows	£16 10s. to £17
Merino Wethers	43s. 9d.
Crossbred Wethers	59s. 6d.
Merino Ewes	31s. 6d.
Crossbred Ewes	50s.
Lambs	35s.
Pigs (Bacon)	78s.
Pigs (Porkers)	51s.
Pigs (Slips)	20s.

LONDON QUOTATIONS.

AUGUST.

Cotton (Uplands): 21d. per lb.
Jute: £67 per ton.
Hemp: £51 10s. per ton.
Rubber: Pará, 2s. 6d. per lb.; Plantation, 2s. 1d. per lb.
Linseed oil, 126s.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY, 1919, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JUNE, 1919 AND 1918, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of Years' Records.	July, 1919.	July, 1918.
North Coast.	In.		In.	In.
Atherton	0·89	18	0·66	0·68
Cairns	1·55	37	3·01	2·80
Cardwell	1·42	47	0·16	0·51
Cooktown	0·99	43	0·87	2·40
Herberton	0·63	32	0·49	0·99
Ingham	1·55	27	0·09	0·41
Innisfail	4·63	28	4·46	3·75
Mossman	1·43	11	1·17	1·48
Townsville	0·54	48	0·02	*nil*
Central Coast.				
Ayr	0·55	32	*nil*	0·18
Bowen	0·93	48	*nil*	0·09
Charters Towers ...	0·55	37	*nil*	*nil*
Mackay	1·63	48	0·44	1·45
Proserpine	1·04	16	0·58	1·03
St. Lawrence ...	1·23	48	*nil*	0·10
South Coast.				
Biggenden	1·28	20	0·22	0·30
Bundaberg	1·94	36	*nil*	0·10
Brisbane	2·22	68	0·18	0·17
Childers	1·66	24	0·03	0·38
Crohamhurst ...	2·92	25	1·35	0·32
Esk	1·93	32	0·14	0·15
Gayndah	1·50	48	0·04	0·27
Gympie	2·14	49	0·38	0·39
Glasshouse M'tains	2·17	11	0·68	0·27
Kilkivan	1·73	40	0·24	0·59
Maryborough ...	1·96	48	0·30	0·40

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of Years' Records.	July, 1919.	July, 1918.
South Coast—continued:	In.		In.	In.
Nambour	2·59	23	1·65	0·87
Nanango	1·73	37	0·12	0·15
Rockhampton ...	1·43	32	*nil*	0·04
Woodford	2·50	32	0·58	*nil*
Darling Downs.				
Dalby	1·79	49	0·08	0·09
Emu Va'e	1·40	23	0·23	0·38
Jimbour	1·70	31	0·11	0·04
Miles	1·78	34	0·18	0·02
Stanthorpe ...	1·94	46	0·27	0·59
Toowoomba ...	1·99	47	0·27	0·44
Warwick	1·76	32	0·13	0·23
Maranoa.				
Roma	1·40	45	*nil*	0·24
State Farms, &c.				
Bungeworgorai ...	0·99	5	*nil*	0·24
Gatton College ...	1·32	20	0·04	0·16
Gindie	1·16	19	*nil*	0·07
Hermitage ...	1·41	13	0·12	0·35
Kairi	0·89	5	*nil*	0·84
Sugar Experiment Station, Mackay	1·33	22	0·15	0·97
Warren	0·76	5	*nil*	*nil*

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July this year, and for the same period of 1918, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, State Meteorologist.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

1919.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·30	5·47	4·59	6 4	4·46	6·27
2	6·2	5·34	5·29	5·48	4·59	6·5	4·46	6·28
3	6·1	5·34	5·28	5·48	4·58	6·6	4·46	6·29
4	6·0	5·35	5·27	5·49	4·57	6·7	4·46	6·30
5	5 59	5·35	5·26	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·25	5·50	4·55	6·8	4·46	6·32
7	5 57	5·36	5 24	5·50	4·55	6·9	4·46	6·32
8	5 56	5·37	5·23	5·51	4·54	6·9	4·46	6·33
9	5·55	5 37	5·22	5·51	4·53	6·10	4·47	6·33
10	5·54	5 38	5·21	5·52	4·53	6·11	4·47	6·34
11	5 53	5·38	5·19	5·52	4·52	6·11	4·47	6·35
12	5 51	5·38	5·18	5·53	4·52	6·12	4·47	6·36
13	5·50	5·38	5·17	5 53	4·52	6·13	4·47	6·36
14	5·49	5·39	5·16	5·54	4·51	6·14	4·48	6 37
15	5·48	5·39	5·15	5·54	4 51	6·14	4·48	6 37
16	5·47	5·40	5·14	5·55	4·51	6·15	4 48	6·38
17	5·46	5·40	5·13	5 55	4·50	6·15	4·49	6·38
18	5·45	5 41	5·12	5·56	4·50	6·16	4·49	6·39
19	5·44	5·41	5·11	5·56	4·49	6·17	4·49	6·39
20	5·43	5·42	5·10	5 57	4 49	6·18	4·50	6·40
21	5·41	5·42	5·9	5·57	4·48	6·19	4·50	6·40
22	5·40	5·43	5·8	5·58	4·48	6·20	4·51	6 41
23	5·39	5·43	5·7	5·58	4·47	6·21	4·51	6·41
24	5·38	5·44	5·6	5·59	4·47	6·22	4·52	6·42
25	5 37	5·44	5·5	5·59	4·47	6·23	4·52	6·42
26	5·35	5·45	5·4	6·0	4·47	6·24	4·53	6·43
27	5·34	5·45	5·3	6·1	4·46	6·25	4·53	6·43
28	5 33	5·46	5·2	6·2	4·46	6·26	4·54	6·44
29	5·32	5·46	5·1	6·3	4·46	6·26	4·54	6·44
30	5·31	5·47	5 0	6·3	4·46	6·27	4·55	6·45
31	...	...	5·0	6·4	...	...	4·56	6·45

PHASES OF THE MOON.

The Phases of the Moon commence at the times stated in Queensland, New South Wales, Victoria, and Tasmania, unless "summer time" is adopted.

		H. M.
3 Sept.	☾ First Quarter	12 22 a.m.
10 „	○ Full Moon	1 54 p.m.
17 „	☽ Last Quarter	7 32 a.m.
24 „	● New Moon	2 34 p.m.

The Moon will be in Perigee on 13th at 6·6 p.m., and in Apogee on the 29th at 3·30 p.m.

2 Oct.	☾ First Quarter	6 37 p.m.
9 „	○ Full Moon	11 39 p.m.
16 „	☽ Last Quarter	3 5 p.m.
24 „	● New Moon	6 40 a.m.

The Moon will be in Perigee on 11th at 2·54 p.m., and in Apogee on the 27th at 6·42 a.m.

1 Nov.	☾ First Quarter	11 43 a.m.
8 „	○ Full Moon	8 35 a.m.
15 „	☽ Last Quarter	1 41 a.m.
23 „	● New Moon	1 20 a.m.

The Moon will be in Perigee on 8th at 11·54 p.m., and in Apogee on the 23rd at 12·24 p.m.

1 Dec.	☾ First Quarter	2 47 a.m.
7 „	○ Full Moon	8 4 p.m.
14 „	☽ Last Quarter	4 2 p.m.
22 „	● New Moon	8 55 p.m.
30 „	☾ First Quarter	3 25 p.m.

The Moon will be in Perigee on 7th at 12·48 p.m., and in Apogee on the 20th at 1·36 p.m.

The Moon will cause an annular eclipse of the Sun on Nov. 23rd, but it will not be visible in Australia. There will also be a partial eclipse of the Moon on Nov. 8th which will be visible in England but not in Australia.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S. —add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, and November may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets and the moonlight then extends all through the night, when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Orchard Notes for October.

THE SOUTHERN COAST DISTRICTS.

As October is often a dry month throughout the greater part of the State, one of the most important duties of the fruitgrower is to keep his orchard or vineyard in a thorough state of cultivation, thus retaining the moisture in the soil that is essential to the setting and development of the fruit crop. As long as the land is level one cannot over-cultivate, as there is no danger of the soil washing, but when the orchard is on a hillside heavy thunderstorms, which may occur during the month, are very apt to cause heavy washaways of soil if the land is kept in the high state of tilth necessary to retain moisture. In this case the cultivation should always be across and not up and down the face of the hill, and where the soil is of such a nature that it will wash badly thin blocks, consisting of a row or two of a growing crop or of light timber, brushwood, or even a body of weeds or heavy mulching, should be provided, such blocks to follow the contour of the orchard. If dry, and water for irrigation is available, citrus trees will be the better for a thorough watering during the month. Give the trees a good soaking, and follow the irrigation by systematic cultivation, as this is much better than constant surface watering, as practised by the Chinese. Examine the orchard and vineyard carefully for pests of all kinds. When young trees are showing signs of scale insects, cyanide same; when leaf-eating insects of any kind are present, spray the plants that are being attacked with arsenate of lead. Look out carefully for black spot and oidium in grape vines, using Bordeaux mixture for the former and sulphur for the latter. When using sulphur, see that you get a fine sample—viz., one in which the particles of sulphur are in a very fine state, as the finer the sulphur the better the results. Do not apply the sulphur in the early morning, but during the heat of the day, as it is the sulphur fumes, not the sulphur, which do the good. A knapsack sulphurer is the best machine for applying sulphur to grape vines, trees, or plants.

Examine any late citrus fruits or early summer fruits for fruit-fly, and take every precaution to keep this great pest in check now, as, if fought systematically now, it will not do anything like the same amount of damage later on as if neglected and allowed to increase unchecked. October is a good month for planting pineapples and bananas. Be sure and have the land properly prepared prior to planting, especially in the case of pineapples, as the deeper the land is worked and the better the state of tilth to which the surface soil is reduced the better the results, as I am satisfied that few crops will pay better for the extra work involved than pines.

THE TROPICAL COAST DISTRICTS.

As the fruit-fly usually becomes more numerous at this time of year, especial care must be taken to examine the fruit thoroughly prior to shipment, and to cull out all fruit that has been attacked by the fly. Banana and pineapple plants may be set out, and the orchards should be kept well tilled, so as to have the land clean and in good order before the heavy summer growth takes place.

All the spring crops of citrus fruits should be now marketed, and the trees, where necessary, should be pruned and sprayed, and the land be well ploughed. The ploughing should be followed by harrowing and cultivating, so as to get the surface of the land in good order. Granadillas and papaws should be shipped to the Southern markets, as, if care is taken in packing and they are sent in the cool chamber, they will carry in good order. These fruits should not be gathered in an immature condition, as, if so, they will never ripen up properly. They should be fully developed but not soft, and if gathered in this condition, carefully handled, and packed and shipped in cool storage, they will reach the Southern markets in good condition, and, once they become commonly known, will meet with a ready sale.

THE SOUTHERN AND CENTRAL TABLELANDS.

In the Stanthorpe district the spraying of apple, pear, and quince trees for codling moth will have to be carefully carried out, the best spray being arsenate of lead, of which there are several reliable brands on the market.

When fungus diseases, such as powdery mildew, &c., are also present, Bordeaux mixture should be combined with the arsenical spray.

The vineyard will require considerable attention, as the vines must be carefully disbudded, and any signs of oidium or black spot should be checked at once. Look out for late spring frosts, and, if possible, try the effect of smudge fires producing dense smoke for preventing any damage.

Keep the orchards and vineyards well cultivated, as it is of the utmost importance to keep the moisture in the soil at this time of the year if a good fruit crop is to be secured.

In the warmer districts cultivation is all-important, and when irrigation is available it should be used for both fruit trees and vines, a thorough soaking followed by systematic cultivation being given.

Farm and Garden Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, sorghum, setaria, imphee, prairie grass, panicum, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred. The planting of the sisal agave and the fourcroya may be proceeded with at any time of the year, but the best time is in spring and beginning of summer, when warm weather and good showers will enable the young plants to root quickly and become firmly established before the winter. The demand for the fibre is constantly increasing, and the supply does not nearly overtake the demand; hence prices keep high, and the outlook for the future is very promising. Cotton may still be sown.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of all kinds of vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Give plenty of water and mulch tomato plants planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant chrysanthemums, gladiolus, and other bulbs, such as tuberose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.